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ABSTRACT

To help establish well-defined standards and norms for proficiency at realistic typing tasks, this investigation sought to establish difficulty indexes for three major classes of such tasks and to provide an initial pool of normative data for the development of the difficulty indexes. To gather the needed data, various subsets of eight tasks from a battery of 64 typing tasks were administered to 3,134 typists. This data, in turn, provided equations for estimating the difficulty of office-typing tasks and for constructing typing tasks at specified levels of difficulty. The difficulty indexes resulting from the equations permit the eventual establishment of standards and norms for trainees and job-applicants. It was discovered that the correlational data on intelligence in relation to typing proficiency support the standard practice of offering beginning typewriting to all persons, but leave uncertain the propriety of offering advanced instruction to low ability students. Finally, low relationships between straight copy and office-typing proficiency confirm the desirability of reducing the conventional heavy focus on ordinary stroking skills and of increasing attention to realistic office-typing tasks. Decision processes applicable to the layout of such tasks on the page should also be emphasized. (Author/JS)

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Summary

No widely accepted performance standards or norms exist for realistic typing tasks, partly because there has been no means of assessing the difficulty of the tasks to which the standards could apply. To provide difficulty indices, various subsets of 8 tasks from a battery of 64 typing tasks (24 business letters, 24 tables, and 16 manuscripts from draft copy) were administered to 3,134 typists completing 1 year, 2 years, and more than 2 years of formal typing training in 137 typing classes of 92 teachers in 21 high schools and 2-year colleges. The mean number of subjects (Ss) per task was 121; and, as inferred from vocabulary test scores, Ss were generally of low ability. The office-task battery means were found to have satisfactory reliability.

Variations in task components found in a pilot study to lead to differences in performance were built into the test items; e.g., differences in length, number of footnotes, number of corrections, type of copy (longhand, typed, mixed type and longhand), enclosures, enumerations, number of columns (in a table or in a table contained in a letter), type of column headings, et al. Except for 3 form letters, the remaining 61 items in the battery were unarranged, requiring the typist to make decisions leading to an attractively arranged product, according to established conventions. Work was scored for speed, number of errors in form or arrangement, and number of uncorrected typographical errors. Canonical correlation analysis was used to predict these three criteria, jointly, from the various features of the tasks, resulting in 18 equations for predicting difficulty: 1 for each of the 3 major classes of tasks (letters, tables, manuscripts) at each of the 3 levels of training (1, 2, and 2+ years) for each of 2 types of indices (stanines and deciles). The difficulty indices predicted for the 3 training levels were so highly intercorrelated that the use of 1 equation (per class of task) across levels might be justified. That is, relative difficulty of tasks was about the same for Ss at various levels of training. Cross-validation applied to a sample of 9 tasks resulted in cross-validity coefficients ranging between .215 and .904 among the various classes of tasks and training levels and one of .666 across tasks and levels. The 18 equations permit the estimation of the difficulty of any business letters, tables, and manuscripts that contain the types of features and range of variations in these features employed in the test battery. Their use permits the eventual establishment of performance standards and norms for realistic tasks of known difficulty among trainees and applicants for employment.

Also furnished are decile norms for speed and percentile norms for the two types of errors on each of the 64 tasks for the low-ability trainees of this study. They provide an initial pool for the eventual establishment of more broadly based standards on tasks of the kind used here.

Ancillary findings concern relationships between intelligence and typing proficiency (very little), ordinary copying skills and proficiency at realistic office-typing tasks (very little), between speed and accuracy (nearly none), and between various office-typing tasks (low to moderate). Among these ancillary findings, the second has the most important implications for training, namely; the desirability of reducing the traditional heavy focus on simple copying skills and of increased and earlier attention to realistic typing tasks and to the decision processes applicable to the typing of such tasks.

Difficulty Indices and Performance Norms For Office-Typing Tasks[1]

For the more than half century that typewriting has been taught on a large scale in the high schools of this country, its chief objective has been vocational. Yet, there exist no broadly based and widely used standards of terminal training proficiency at the kinds of tasks engaged in by employed typists (e.g., correspondence, tables, manuscripts and reports). In contrast, there are substantial compilations of proficiency scores, with well-developed and widely used norms, for "straight copy" typing: the line-for-line copying of perfectly printed prose, without error correction and involving no considerations of arrangement of materials on the page other than reasonably regular right-hand margins and, sometimes, correct word division. Further, straight copy practice and test materials have been constructed at known difficulty levels, based on measures of the characteristics of the copy shown to be correlated with stroking speed. Accordingly, it has been possible to measure straight copy skills on materials of known difficulty and to attribute changes in scores to changes in skill, unconfounded by differences in the difficulty of the materials.

The historical focus on straight copy skills appears to be due, in part, to the assumption that keystroking skill is the major component in proficiency at realistic vocational typing tasks and, in part, to the absence of indices of difficulty for vocational typing tasks. In recent years, evidence has been accumulating that stroking skill plays a modest role in total proficiency at vocational tasks and that skill at such tasks is based largely on factors intrinsic to them and wholly absent in ordinary copying. However, the development of standards and norms for vocational typing tasks (to replace the mistaken focus on ordinary copying skills) requires, as a precondition, some means of specifying and controlling for the difficulty of such tasks. With indices of vocational typing task difficulty in hand, it will be possible to develop training norms and standards and to express proficiency at tasks of specified difficulty. Further, a change in score over time at tasks of the same difficulty could properly be attributed to a change in skill, unconfounded by a change in task difficulty. Also, for training purposes, difficulty indices would make possible the grading of practice materials according to difficulty during the course of instruction.

Purposes. The need in typewriting training and among employers, then, is for well-developed standards and norms for proficiency at realistic typing tasks. To that end, the principal purpose of the present investigation was to establish difficulty indices for three major classes of such tasks, identified in earlier studies as prominent in vocational and personal typing activities; namely, business correspondence, tables, and reports or manuscripts from rough draft copy, labeled, hereinafter, as "office-typing tasks." A second major purpose was to provide an initial pool of normative data as a partial basis for eventual standards for the tasks used for the development of difficulty indices. These data apply to high school trainees completing one and two years of training and to community college students with more than two years of formal typewriting training. The various training levels were used because of the expectation that task difficulty might vary with differences in amount of prior training.

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[1] The portion of this study that deals with difficulty indices is in process of preparation as a doctoral thesis at Teachers College, Columbia University, and will contain additional details of procedures and findings not judged necessary or desirable for inclusion here.

Ancillary to the two foregoing major purposes were three minor ones bearing on the estimation of relationships:

1. Between intelligence (as measured by vocabulary test scores) and office-typing task performance--as a potential partial basis for screening applicants for advanced typing training.

2. Between straight copy and office-typing performance (for speed and quality of work)--as a basis for assessing the contribution to proficiency at realistic typing tasks of ordinary copying skills and, in turn, the appropriate extent of focus on copying skills during training.

3. Among performance scores on the various office-typing tasks--as an index of the extent of transfer of skills from one type of task to another.

Related Research

The pertinent related research concerns: (1) Existing difficulty indices for typing tasks, (2) Existing information on task proficiency and intertask relationships, (3) Intelligence as a predictor of typing performance, and (4) Identification of the prominent classes of typing activities. Each of these topics is discussed in turn.

Difficulty Indices

Indices of difficulty have been developed in a number of fields (e.g., reading, shorthand dictation materials). For typewriting, the difficulty of ordinary prose materials for use under straight copy conditions has typically been assessed via one or more of three language characteristics: percentage of common words, syllabic intensity (mean number of speech syllables per dictionary word), and stroke intensity (mean number of typewriter strokes per dictionary word, including spacing and punctuation). Bell (1949), for example, developed a "typewritability" index leading to a 9-point scale of difficulty. Robinson (1968) estimated the differences in performance (speed and errors) that accompanied differences in each of the three indices.

Although several authorities have pointed to a need for indices of difficulty for office-typing tasks, the one study that has been conducted had so many procedural weaknesses as to limit its usefulness.[2]

The absence of indices of task difficulty as a barrier to the establishment of proficiency norms has been mentioned by a number of writers (Reigner, 1936; Rowe, 1967; Russon, 1966; Tate, 1962). Specifically, West (1964, p. 79) suggested that "two major areas for inquiry, as yet untouched, are (a) indices of difficulty for real-life typing tasks and (b) accumulation of performance-standard data on office typing tasks," and he outlined (West, 1969, pp. 575-7) the general tactics applicable to the development of indices.

Task Proficiency and Intercorrelations

Available data on proficiency of terminal trainees at office-typing tasks are modest in amount, and interpretation of that data points to the need for difficulty indices. In addition, data on intertask relationships reveal the modest role of copying skills in office-typing task proficiency and identify the need for difficulty indices for each type of office task, as follows:

Office-Typing Task Proficiency Levels. A review of 22 studies shows a range of mean speeds at business letters from a low of 15 words per minute (wpm) (Muhich, 1967) to a high of 39 wpm (Martin, 1954), table speeds ranging from 4 wpm (Kerl, 1941) to 27 wpm (Martin, 1954), and rough draft manuscript speeds from 10 wpm (Muhich, 1967) to 36 wpm (Martin, 1954). Aside from such factors as differences in amount and kind of training, other features that probably account for the variations in outcomes are variations in test content and, especially, in test conditions. In some of the studies (e.g., Martin, 1954), tasks were prearranged, requiring no placement decisions; in others (e.g., Muhich, 1967), the copy was unarranged, requiring the examinee to make placement decisions. In some studies, errors were to be corrected; in others, not. Concerning test content, ambiguity exists in attempts to describe a task as "fairly difficult," "of average difficulty," and so on. Even more explicit verbal descriptions--e.g., "Two longhand tables, including columnar and main headings: one of three columns, the other of four columns--but each containing the equivalent of 50 5-stroke words" (West and Bolanovich, 1963, p. 404)--do not permit sufficiently precise comparisons among tasks.

Intertask Relationships. The error in the conventional focus on straight copy skills and in the underlying assumption that such skills play a major role in proficiency at realistic typing tasks is revealed in the correlational data for these two types of tasks. Simple analysis of the task requirements should make apparent that straight copy typing involves only stroking skills, whereas office or "production" typing, as it is also called, involves additional components wholly absent in ordinary copying (viz., knowledge of conventions of format, decision-making about placement of materials on the page, additional machine manipulation, proofreading, error correction). The expectation should therefore be of low to moderate correlations between straight copy measures and measures of office-typing proficiency. Past findings support that expectation. In thirteen studies, several of which are summarized by Muhich (1967), r's between gross straight copy speed and speed (under a number of work conditions) at office-typing tasks ranged between .07 (Jiles, 1957) and .84 (Muhich, 1967), averaging (by z transformation) .61. Error r's ranged between .22 (Muhich, 1967) and .35 (West and Bolanovich, 1963). Straight copy speed is only moderately correlated with production speed, whereas straight copy accuracy is nearly useless as an index of production accuracy. It is apparent that straight copy training is not a sufficient preparation for office typing and that straight copy skills are weak indices of production skills. Direct measures of office-typing proficiency are needed.

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[2] Wise (1969) disregarded unmailable work, discarded the work of students who typed at a production rate below 20 wpm, and introduced serious practice effects by using the same content in each of 16 different test items.

Among office-typing tasks, speed intercorrelations in three studies reviewed ranged between .34 (West, 1960) and .87 (Muhich, 1967), averaging, by z transformation, .67; whereas error intercorrelations ranged between .34 (Muhich, 1967) and .68 (West and Bolanovich, 1963), averaging .49. These correlations are not high enough to justify the use of measures of one task as indices of performance on other office tasks. The various types of office tasks need to be dealt with individually.

Intelligence as a Predictor of Typing Proficiency

Intelligence is virtually uncorrelated with straight copy proficiency; the r's for speed in 16 studies, several of which were summarized by Muhich (1967), ranged from .04 (Eckert, 1960) to .62 (McIntire, 1934), averaging, by z transformation, .35; for errors, the r's in 6 studies reviewed, ranged from .01 (Eckert, 1960) to .31 (White, 1935), averaging .19. The evidence on relationships between intelligence and production typing proficiency, on the other hand, is ambiguous; r's reported in 7 studies ranged from a low of .02 (Dake, 1935) to a high of .81 (Cook and Appel, 1941), varying with variations in the test copy, modes of scoring, range of student IQ scores, and the intelligence measure employed. Additional evidence on the issue is needed as a potential basis for screening of applicants for advanced typing training.

Prominent Typing Activities

Earlier surveys identify business letters, tables, and reports or manuscripts from rough draft copy as the three leading classes of nontrivial typing tasks, both vocationally (Batchelor, 1950; Frisch, 1953; Perkins, Byrd, and Roley, 1968) and, to a slightly lesser extent, in personal typing (Featheringham, 1965). Another task, form fill-in work, is a leading one among "clerical" typists, but is omitted from the present investigation because the great variety of forms does not permit constructing, for present purposes, one or more forms that could be thought to be representative of all forms. The three leading classes of tasks mentioned previously are also the leading office-typing tasks in typewriting textbooks, as shown by Muhich (1967), and by the content of commercially published typewriting achievement and employment tests (Buros, 1965).

The pertinent related research supports the need for standards and norms for office-typing tasks and for difficulty indices for such tasks as a basis for interpretable standards and norms. The evidence further identifies the three prominent classes of office-typing tasks, the need for dealing with each class individually, and the desirability of collecting additional information on intertask relationships and on intelligence as a predictor of office-typing proficiency.

Procedures

The chief procedures are those applicable to the development of difficulty indices for three classes of office-typing tasks among typists at three levels of training (2, 4, and 4+ semesters), estimation of the reliability of the performance scores used to develop the indices, and cross-validation of the obtained difficulty indices. Collection of a beginning pool of normative data is also involved. Details are given for (1) Office-typing task variables, (2) Test instruments, (3) Subjects, (4) Test administration, (5) Test scoring, and (6) Modes of data analysis.

Office-Typing Task Variables

The task variables included in the test battery were identified in a pilot study that also served to refine test administration procedures. Within each of the three major classes of tasks, the possible variations in intraclass components are quite large in number, and it is neither practicable nor necessary to deal with all possible task component combinations. To identify those variables that do make a difference in performance, a test battery consisting of 8 letters, 8 tables, and 5 manuscripts was administered to 80 students in 3 typing classes of 2 senior colleges in New York City. For each class of task, a basic task was constructed, with each additional task in that class having only one feature different from the basic version.

Findings from this pilot study identified three variables that contributed nothing to difficulty as measured by speed and error differences between the basic version and the version with these three features: viz., in letters, an attention line, a subject line, and a carbon-copy notation. The remaining task variables, retained for incorporation into the final office-typing task battery because they led to significant performance differences in the pilot study, are:

Tables: A. Number of columns (2 vs. 3 vs. 4 vs. 5)

B. Column headings (with vs. without)

C. Column-head complexity

- a. Single vs. double line
- b. Longer vs. shorter than column
- c. Braced vs. no braced head

D. Length (37½ vs. 75 5-stroke words)

Letters: E. Enclosures (with vs. without)

F. Listed enumerations (with vs. without)

G. Tables (with vs. without); if "with," then:

- a. With vs. without column heads
- b. Number of columns
- c. Number of column heads shorter than columns
- d. Number of words in table (8 to 39 5-stroke words)

H. Letter form (unarranged letter vs. prearranged form letter)

I. Length (75 vs. 150 5-stroke words, including table, if any)

Manuscripts: J. Type of copy (longhand vs. mixed type and longhand)

K. Number of footnotes (0 vs. 1 vs. 2)

L. Number of corrections (0 vs. 7 vs. 14)

M. Length (75 vs. 150 5-stroke words)

Test Instruments

The test instruments consisted of (1) a 20-word, multiple choice vocabulary test, used as an estimate of intelligence of subjects (*S*s), (2) a 3-minute straight copy timed writing, and (3) a battery of 64 office-typing tasks.

Vocabulary Test. Intelligence test scores were not available on all students' records, and those recorded arose from a number of different tests that do not generate directly comparable scores. To provide a uniform basis for estimating intelligence, the 20-word vocabulary test (Form 2) from the CAVD scale of Thorndike and others (Buros, 1965) was administered to all *S*s. For two of the five forms Miner (1961) reported correlations (corrected for attenuation) with the WAIS (Wechsler Adult intelligence Scale) of .84 and .86.

Straight Copy Timed Writing. To provide information on the relationship between ordinary stroking skill and proficiency at office-typing tasks, a 3-minute timing on ordinary prose materials of average difficulty (syllabic intensity of 1.53 and stroke intensity of 6.0) was administered to all Ss (Appendix B, p. 75). The level of difficulty was selected to conform with the average for Silverthorn's vocabulary of written business communication (1955) as reported by West (1968).

Office-Typing Task Battery. The office-typing task battery consisted of 24 business letters, 24 tables, and 16 manuscripts. The test materials were in some instances composed and in other instances adapted from a variety of sources. They are shown in Appendix B, pp. 76-134. Details follow on (a) item construction, (b) assignment of task features to test items, and (c) assembly of test booklets.

(a) Item Construction. Based on Frisch's (1953) finding that the majority of the stimulus materials of the employed clerical typist were in longhand or mixed type and longhand, all tables and all letters, except for the form letters, were in longhand; manuscripts were wholly in longhand, in mixed type and longhand, or wholly typewritten. All office-typing tasks had a stroke intensity of 6.0, the same as the straight copy timed writing.

(b) Assignment of Task Features to Test Items. The task variables or features or components are those listed on page 6. As mandated by the requirements of statistical analyses for difficulty indices (pp. 11-14), features were assigned to tasks at random, with results as given in Appendix A, Tables 19-21, pp. 39-41.

(c) Assembly of Test Booklets. Because the entire test battery of 64 tasks could not be typed by any student in the testing time available (4-5 days per class), the 64 tasks were distributed into 8 booklets containing 8 tasks per booklet, and each student was given one booklet. Three different kinds of task "packaging" were used.

In the earliest testing (that of 2-year college students) the 24 tables were randomly assigned to three booklets, each containing 8 tables. Each typing class was then randomly divided into thirds, and each third of the class typed from a different table booklet. To insure independent work and to randomize practice and fatigue effects, each set of 8 tables was arranged in two random orders for random distribution within each third of each class.

It was quickly recognized that the foregoing arrangement of task booklets sacrificed information on interrelationships among different classes of tasks and, especially, that the potential for substantial practice effects was strong. Therefore, for the remaining testing of 2-year college students (on letters and manuscripts) each booklet contained both letters and manuscripts.

The bulk of the testing was of high school trainees. For them, each booklet contained all three classes of tasks, with 8 tasks in each (i.e., 3 letters, 3 tables, and 2 manuscripts) arranged so that two tasks of the same kind did not follow consecutively. Eight different sets of booklets were arranged in 5+ different orders, providing 42 booklets in all.

Subjects

One group of Ss was used to establish difficulty indices for office-typing tasks; another group of Ss was used to estimate the reliability of the office-typing task performance means and to cross-validate the difficulty indices.

Subjects for Difficulty Indices. Three considerations mandated a substantial number (N) of Ss for the establishment of difficulty indices, as follows:

1. The need to represent each of three terminal stages or "levels" of typing training (2, 4, and 4+ semesters).

2. A large number of tasks required to represent the variety of intratask difficulty factors and to provide a sufficient statistical base for developing indices.

3. The provision of an initial pool of scores as a basis for the eventual establishment of proficiency norms that could be used as a basis for terminal training standards.

Indices of task difficulty for use in assessing readiness for employment are properly based on the performance of students at terminal stages of training. In the nation's secondary schools, vocational typing is taken as a 1-year course by 70 percent of registrants and as a 2-year course by most of the remaining registrants (Wright, 1964, 1965). Accordingly, those completing 2 and 4 semesters of high school training provided most of the Ss for this investigation. The remaining Ss, representing more than 4 semesters (4+) of formal typing training, were drawn from 2-year colleges.

Information on amount of typing training (including the present course) among 2-year college students was secured from Ss via questionnaire. Junior high school typing was excluded because of the wide variation in number of semesters of such training, in the number of typing class periods per week, and in the interval between junior high school and current training. In nontyping courses that include some typing, the percentage of time devoted to typing was multiplied by the number of semesters in such courses, and added to the number of semesters in actual typewriting courses. In the 2-year colleges, only Ss with more than 4 semesters of typewriting were included.

Ss consisted of (a) 1335 2nd-semester students in 52 classes of 36 different teachers in 11 high schools, of (b) 1214 4th-semester students in 48 classes of 32 different teachers in 12 high schools in New York City, suburbs of New York, and New Jersey, and of (c) 585 2-year college students with more than 4 semesters of typing in 37 classes of 29 different teachers in 9 2-year colleges in New York City, Long Island, and Massachusetts.

These typing trainees, according to their scores on the intelligence-related vocabulary test, were generally low-ability students. Thus the findings of this study apply primarily to low-ability trainees.

Although the total number of Ss tested was thought sufficient to supply the desired minimum of 150 trainees per task per training level, that objective was not always achieved. Student absenteeism (on one or more days of a full week of testing), occasional failure of test administrators to record item-completion time, students' names missing from test papers, typewriter malfunctions, and comparable annoyances led to attrition in the number of usable Ss. Usable Ns per task per level ranged from a low of 54 to a high of 188, with a mean of 121. Ns are given by item and by level in Tables 22-24 in Appendix A, pp. 42-47.

Subjects for Reliability of Means and Cross-Validation. Test administration for estimating the reliability of the means for the office tasks and for cross-validating the difficulty indices was carried out one year after the testing for the development of difficulty indices. New Ss were used, consisting of 88 2nd-semester students from 3 classes of 3 different teachers in 2 high schools, 94 4th-semester students in 8 classes of 4 different teachers in 3 high schools, and 55 4+-semester students in 3 classes of 3 different teachers in 2 2-year colleges.

Test Administration

All tests were administered during the last month of the academic year. On the first day of testing, all 2-year college students completed the background questionnaire, and all high school and college students completed the vocabulary test and the 3-minute straight-copy timed writing under no-erasing conditions. Students then typed from the booklet containing the eight office tasks, under instructions to proofread all work and to make corrections before submitting each task as completed. As the completed task was handed in, the cumulative typing time for the day was recorded. Completion time for each task was obtained by subtracting the cumulative completion time for that task from the cumulative completion time for the next task. If a student did not complete a task when the period was over, it was collected and returned to him for completion the following day. He was allowed to align the paper in his typewriter just as it was on the previous day when the period ended. Timing began when Ss announced their readiness to resume typing. Completion time on these tasks was determined by subtracting the cumulative time for the last completed task the previous day from the total time for that day and then adding the time taken on the following day to complete the task.

Detailed instructions to Ss were prepared by the investigator, duplicated for distribution to Ss, and read verbatim to Ss by test administrators.

Test Scoring

Straight-copy performance was scored for total strokes and for number of errors. In reporting results, total strokes were converted to gross words per minute (gwpm) by dividing total strokes by 15 (5 strokes per word times 3 minutes).

Speed on office activities was measured by completion time to the nearest quarter minute for each task. Quality was measured by the number of uncorrected typographical errors and the number of form errors. Form errors are those in placement of materials on the page (e.g., an off-center heading, unequal spacing between table columns, et al.) or ones that violate typewriting conventions (e.g., more than one blank line between the inside address and salutation of a letter).

To maximize the reliability of test scoring by the several test scorers, a scoring manual was developed showing details on computing completion time and on scoring typographical and form errors. All tasks, both straight copy and office, were scored twice, by different scorers.

Reliability of the Means

The sheer volume of 64 office tasks precluded direct assessment of the reliability of performance scores on each task via conventional test-retest methods. That is, with an entire week required for initial administration of an 8-task booklet to each S, there was no possibility of securing the permission of school personnel for readministration of the entire test battery to the same Ss during a second week. Instead, indirect evidence for stability of mean scores was secured by readministration of 9 selected tasks (3 letters, 3 tables, 3 manuscripts) to a new sample of (38 to 60) comparable examinees at each of the three training levels.

As it was necessary to select the 9 tasks before analysis of the original data had been completed, there was no basis for combining the 3 criteria of completion time, typographical errors, and form errors. Therefore, the single criterion of completion time was used to rank order the letters, tables, and manuscripts--based on a random sample of 25 papers at each of the 3 training levels for each of the 64 tasks in the initial administration. The 9 tasks then consisted of 3 letters, 3 tables, and 3 manuscripts: one of each at approximately the 27th, 50th, and 73rd percentile in the rank-ordered lists. The same 9 tasks were identified at each of the 3 training levels.

Differences in means for the two administrations of the 9 tasks (initially and one year later) were subjected to t test. Of the 81 t-tests (3 levels x 3 criterion measures x 9 tasks), nonsignificant ts were found for 18 speed measures, 17 measures of typographical errors, and 16 measures of form errors. Since measures of different subjects should be expected to show less agreement than repeated measures of the same subjects, the finding of fair stability of performance means for the tasks under rather severe conditions suggests that the measures tend to have acceptable stability for their purposes.

A second measure of the stability of the means was secured by correlating the means of the criterion scores on the first administration of the tasks with those on the second administration. The 9 obtained correlations (3 levels x 3 criteria) were all significantly different from zero at the .01 level and ranged from .77 (semester 4+ for typographical errors) to .98 (semester 4 for completion time), with a mean, using z-transformation, of .93. These correlations also suggest an acceptable level of stability of the means for their purposes in this study.

Data Analyses

Data analyses, as described in more detail below, pertain to (1) the development of difficulty indices and their validation and cross validation, (2) the furnishing of normative performance data on each of the 64 tasks, as an initial basis for eventual performance norms, and (3) estimation of performance intercorrelations. All tests of significance used a minimum probability level of .05.

Difficulty Indices. Office-task difficulty is measured by speed and accuracy of performance: here, by completion time, form errors, and uncorrected typographical errors. Speed and errors are presumably a function of, are predicted by, the characteristics of the task (as given on page 6). There are, here, multiple predictors of multiple criteria, to which canonical correlation analysis is applicable. A canonical correlation ranges between 0 and +1 and measures the relationship between the predictors, taken together, and the criterion measures, taken together.

In this investigation, the end products of canonical analysis are:

a. Potentially, 27 canonical equations--3 levels of training x 3 classes of tasks x 3 criterion measures (each equation gives emphasis to a different criterion)--for predicting the difficulty of a task within a given class at a given level of training.

b. A difficulty index (in stanine and in decile form) for each of the 64 tasks in the test battery.

The steps in canonical analysis, after expressing all raw performance scores and predictor values in z-score form (Mean = 0, SD = 1), as mandated by the requirements of canonical correlation analysis, may be outlined as follows:

1. Analysis of means for each of three criterion variables (completion time, form errors, typographical errors), for each of 64 tasks, by class of task (letter, table, manuscript), by level (2, 4, 4+ semesters of prior training), using the values of the task characteristics (Tables 19-21, pp. 39-41) as predictors, provided:

a. The canonical correlation for each root (1 root for each criterion variable), emphasizing each criterion in turn in such a manner as to maximize the correlation

b. Canonical weights (analogous to Beta weights) for each predictor and criterion variable, which, in turn, leads to canonical equations

c. Chi-square tests of the significance of each R_c (canonical correlation)

d. Numerous correlation matrices

An example may be helpful in further explaining point 1a, listed immediately above. Each root emphasizes a different criterion, but does not discount the other criteria. For example, the first root might choose completion time to emphasize (because it provides the highest canonical correlation). Then the other two criteria are given weights. For the second root, form errors may be emphasized because they have the second highest correlation, and the other two criteria are now given weights. In each case, there is a canonical weight for each of the criteria for each of the three roots.

2. The useful equations (Step 1b, above) are those whose roots are associated with the statistically significant canonical correlations. The first two roots were found to be statistically significant in most of the analyses (see p. 17). Thus, for each of the 64 tasks, the obtained canonical weights (from 1b above) were then applied to the z-values of the predictor variables and to the z-values of the means of the criterion variables. For each of the canonical equations associated with the first two roots in each analysis, the composite value of the predictors is on one side of the equals sign and the composite value of the criteria is on the other side. In order to maximize the prediction, the composite values of the predictor variables were multiplied by the square of the canonical correlation (R_c^2).

3. "Validating" (in the sense of verifying the computational processes leading to the canonical equations and composite scores of Step 2) involved correlation of the obtained scores with those predicted by the canonical equations. The resulting correlations should match the canonical correlations.

4. Summation of the composite predictor scores (for each statistically significant root) follows from the fact that each root emphasizes a different aspect of difficulty and from the findings, in the present instance, that (a) not all roots were significant and that (b) there was more than one significant root (in fact, two) for each class of task at each level of training. The 18 composite predictor scores (2 significant roots x 3 classes of tasks x 3 levels of training) yielded 9 summed composite predictor scores (3 classes of tasks x 3 levels of training).

5. Validation of the summed composite scores used multiple regression analysis, resulting in a multiple correlation between the predictor variables and the summed predicted scores.

The steps outlined thus far identify weights for the variables that arise from the performance scores of examinees and are such as to maximize the correlations between predictors and criteria. Therefore:

6. The results were cross-validated against the obtained scores of an independent sample of examinees: those involved in the estimate of the reliability of the means (see p. 10). That is, the scores predicted from the canonical equations arising from initial testing were correlated with the obtained scores on the nine tasks involved in reliability testing: by level, by class of task, and across levels and tasks.

Ideally, cross-validation of the difficulty indices should involve administration of a new test battery to comparable examinees and the correlating of the obtained scores with scores predicted from the present canonical equations. In the absence of that mode of cross-validation, the propriety of extrapolation of the present findings to new office tasks should be judged as tentative. On the other hand, given the task characteristics employed as predictors in the present investigation, new tasks incorporating the same characteristics would differ from the present tasks only in their vocabulary. For example, the examinee's table-typing behavior in centering the column heading River over Mississippi differs in no wise from his behavior in centering, in some other table, the column heading State over California. A collection letter to Mr. Jones that lists two enclosures calls for the same responses by the examinee as a sales letter to Mr. Smith that lists a number of enclosures. It seems logically apparent that it is the format features of office tasks, not their vocabulary, that makes a difference. Accordingly, there would appear to be little risk in applying the findings of the present investigation to any letters, tables, and manuscripts--provided they do not contain features absent from the tasks of the present study. In fact, such differences in findings as might occur would more likely be due to differences among examinees than to differences in the vocabulary of tasks. However, confirming the expectation of the applicability of present findings to new tasks and new examinees is a matter for future investigation.

7. A check was carried out against the possibility of the spuriously high canonical correlations that can result because canonical processes assign large weight to highly correlated variables, with other variables weighted so as to maximize the relationship. For that purpose, cross-correlation matrices were obtained and examined.

8. For use as indices of task difficulty, the summed predicted scores (Step 4, above) were converted into two types of scores: (a) deciles and (b) stanines (Mean = 5, SD = 2), recorded to the next higher whole number in instances of obtained decimal values.

9. The statistical procedures outlined in steps 1-8, above, require the conversion of raw scores into z-scores, and then several additional steps before the difficulty index, as expressed by either deciles or stanines, can be obtained. To permit future investigators and users to assign difficulty indices directly from the raw score values of the task variables--as an alternative to the several steps outlined above--multiple regression equations were derived, using the obtained difficulty indices for each of the tasks (from Step 8) as criterion scores. The raw score values of the task characteristics (Tables 19-21, pp. 39-41) were used as predictors. The resulting equations permit direct prediction,

and multiple correlations provide estimates of the accuracy of those predictions. Multiple regression analysis was performed by level, by class of task, for each of the two types of indices (deciles and stanines).

Performance Norms. As an initial basis for eventual standards for office-typing tasks, distributions of selected percentile values were computed for each criterion variable, for each of the 64 tasks, by level, with the criterion scores expressed in raw score form.

Performance Intercorrelations. To estimate relationships between intelligence and typing performance, vocabulary test scores (by level of training) were correlated with speed and errors in straight copy typing and with completion time, uncorrected typographical errors, and form errors in each of the 64 typing tasks, within class of task. Relationships between straight-copy and office-task performances were estimated by correlating copying speed with office-task completion time. Correlations between straight-copy speed and the two types of office-task errors and between straight-copy errors and office-task errors were not computed because the variables have no logical relationship, thus rendering correlations meaningless. Intercorrelations among office tasks (64 x 64 matrices) were computed for each of the three criterion variables, by level of training; and, for each of the 64 tasks, speed was correlated with each of the two types of errors, by level. In all instances, the average correlation was taken as the median of the distribution of *r*'s (Garrett, 1949).

Results and Discussion

Descriptive data include mean scores and standard deviations (SDs) for each of the 3 training levels for (a) vocabulary test scores, (b) straight-copy speed and errors, and (c) completion time, uncorrected typographical errors, and form errors on each of the 64 office-typing tasks. Analytical data pertain to (d) difficulty indices, (e) performance norms, and (f) performance intercorrelations. The tabular displays of major findings and end products of this investigation are in the body of the report; finer details and interim data are shown in appendix tables.

Means and Standard Deviations of Performance Scores

Means and SDs (by level) on the vocabulary test, the straight copy timed writing, and each of the 64 office-typing tasks are reported.

The *vocabulary test*, administered as an estimate of intelligence, has a maximum possible score of 20. Findings are displayed in Table 1, page 15. For *S*s in Semesters 2 and 4 the mean score was at approximately the ninth grade level; for 2-year college *S*s, at the twelfth grade level. The items in the vocabulary test are scaled in difficulty order, i.e., a student who is unable to respond correctly to item number 9 is unlikely to know any of the words between 10 and 20, except for correct guesses. The typical high school typist knows that *downcast* means *sad*, but does not know that *average* means *ordinary*. The typical 2-year college typist knows that *dynasty* means ruling family, but does not know that sexton means janitor. The decrease from Semester 2 to Semester 4 scores may be explained by the fact that the brighter students were stenographic majors who took only one year of typewriting, while the 2-year students were less bright general clerical majors.

Table 1
Vocabulary Test Means and Standard Deviations
(By Level)

Level (Semester)	N	Mean	SD	Mental Age*
2	1326	8.55	2.90	14-3
4	1209	7.97	2.56	13-10
4+	585	11.79	2.39	16-6

*Mental Age equivalents for the means (in years and months) are given by Miner (1961).

The straight copy means and SDs are displayed in Table 2.

Table 2
Straight-Copy Means and Standard Deviations
For Speed and Errors*
(By Level)

Level (Semester)	N	Gross Words Per Minute		Errors	
		Mean	SD	Mean	SD
2	1326	33.66	13.65	8.08	5.16
4	1195	38.55	14.31	8.65	6.52
4+	581	54.68	21.96	6.20	5.86

*3-minute timed writing.

The data of Table 2 show that students in Semesters 2 and 4 averaged about 2.8 errors per minute (epm), while Semester 4+ students averaged 2.1 epm. The high school mean speeds (34 and 39 wpm) were below the 40-wpm minimum standard for many Civil Service positions.

The office-typing task means, for each of the 64 tasks (Appendix A, Tables 22-24, pp. 42-47), were the values used in the development of the difficulty indices. They are summarized across class of task in Table 3, p. 16.

Table 3
Office-Typing Task Means
(By and Across Class of Task; By Level)

Class of Task and Semester	Mean N	Completion Time (quarter minutes)	Typographical Errors	Form Errors
24 Letters				
2	109	58.66	4.31	6.27
4	117	52.33	3.22	5.18
4+	116	36.42	1.01	2.62
24 Tables				
2	109	53.25	2.12	6.19
4	124	49.02	1.70	5.50
4+	156	33.91	0.64	3.50
16 Manuscripts				
2	103	53.20	4.31	7.96
4	130	50.74	3.26	7.30
4+	120	33.23	1.05	2.91
Across 64 Tasks				
2	107	55.04	3.58	6.81
4	124	50.70	2.73	5.99
4+	131	34.52	0.90	3.01

Across tasks, the second year of typing training adds 8% to speed and reduces uncorrected typographical errors by 24% and form errors by 12%, as compared to Semester 2 Ss. For example, tasks that require, on the average, 14-15 minutes to complete, are completed in only 3/4 to 1-1/2 fewer minutes with a second year of training. Errors, on the other hand, are reduced by about 1/4 to 1/6. Additional training and selection, (i.e., Semester 4+ Ss compared to Semester 4 Ss) add 32% to speed and reduce uncorrected typographical errors by 67% and form errors by 50%.

The wide range of the means in Table 3 demonstrates the need for identifying the specific level of difficulty of any office-typing task. So do the differences in student performance for different tasks of the same length. Also apparent are differences in performance following differences in amount of previous typewriting training. These various findings are congruent with expectations, and support the need for the current investigation and the pertinence of its procedures to its purposes.

For canonical correlation analysis, the subjects are not the individual students but, rather, the tasks. Thus, the mean scores for each task became the values for each "subject," i.e., for each task.

Difficulty Indices

The several steps outlined in the procedures section were followed to develop the difficulty indices for each of the 64 tasks for each of the three training levels. The numbered paragraphs below match the numbering of the "procedures" paragraphs (pp. 11-14). The results of intermediate steps in analysis are summarily characterized and detailed findings are shown only for the major end products of the analysis.

1. The canonical correlation analysis provided all of the data described earlier (p. 11, point 1). The canonical correlations for the first two roots were statistically significant at at least the .05 level, except for Semester 4+ Letters and Semester 4+ Tables, both of which had correlations that were significant only for the first root. Correlations for the first root ranged from a low of .941 to a high of .977; for the second root they ranged from .701 to .972. These results mandated the use of the first two roots in the analyses. Each emphasizes a different criterion and describes a relationship with the predictor variables that is statistically significant.

2. The procedures given in Step 2 (p. 12) were carried out.

3. The validation process confirmed the accuracy of the original computations. That is, the correlations of the obtained with the predicted scores matched the canonical correlations.

4. The composite predictor scores for each of the two roots for each analysis were summed. As each root reflects an emphasis on a different criterion variable, to provide a prediction of over-all difficulty it was necessary to sum the composite predictor scores for both of the significant canonical correlations. For example, the first root might emphasize completion time, and on that basis the task might be very difficult. The second root might emphasize form errors, and, on that basis, the task might be very simple. By summing the predicted scores for both roots, the task would be predicted to be of average difficulty. On the other hand, if the task were very difficult on both criteria, the summed predictor score would indicate that the overall difficulty level was also high. The higher the number, after adding the two composite scores, the more difficult the task is predicted to be; the lower the number, the easier the task is predicted to be. Because this process takes all three criterion measures into account, it is possible that one task can be typed more quickly than a second task and still be more difficult because of the greater number of form and uncorrected typographical errors. The predicted rank order of task difficulty may not be the same as the actual rank order because the obtained canonical correlations were less than 1 and therefore do not predict perfectly.

5. It was next necessary to estimate the validity of summing the composite predictor scores for the first two roots. This was accomplished by using multiple regression analysis to examine how well the summed predicted score can be predicted by the predictor variables. The resulting multiple correlations ranged from .920 to 1.000. This analysis supports the use of the summed composite scores for estimating the difficulty levels of the tasks.

6. For cross-validation, the task means (obtained from the second administration of the 9 test instruments used in establishing the reliability of the means) were transformed, using the *z*-scores of the first administration. After substituting these *z*-scores in the canonical equations for the first two roots, the two composite criterion scores for each task were summed and correlated with the summed composite predictor scores. The resulting cross-validity coefficients are shown in Table 4.

Table 4
Cross-Validity Coefficients Using Nine Tasks[a]
(By Level, By Class, and Across Level and Class)

Variable	Coefficient
By Level (Semester)	
2	.895**
4	.902**
4+	.215
By Class of Task	
Letters	.796**
Tables	.597*
Manuscripts	.904**
Across Level and Class	.666**

[a] *N* for *Across Level and Class* is 27 (9 Tasks x 3 Levels).

*$p < .05$. **$p < .01$.

Of the 7 cross-validity coefficients shown in Table 4, all were significantly different from zero at the .01 level, except for Semester 4+ *S*s (nonsignificant) and for tables (significant at the .05 level). Because of the low cross-validity coefficient for Semester 4+ *S*s, the cross-validity coefficients by class of task and across level and class of task were further depressed. The 6 significant coefficients indicate that the obtained canonical correlations predict student performance significantly at Semesters 2 and 4 for each class of tasks and across levels and class of task.

7. Examination of the predictor-criterion intercorrelations reveals that there are rather high intercorrelations (highest correlation in each matrix ranging from .72 to .91). Although this does create spuriously high canonical correlations (i.e., the canonical correlation is inflated because of the high intercorrelations), canonical analysis takes into account the complex nature of the variables that account for difficulty and is mandated by the need to provide weights that could combine the criterion variables or components of performance, rather than merely explain the relationship between the two sets of variables. Thus, the high intercorrelations do not invalidate the use of the canonical equations for their purposes.

8. As described in the procedures section, the summed composite predicted scores were standardized into stanines and deciles. The resulting stanines and deciles are the difficulty indices for each of the office-typing tasks. These indices are shown in Tables 5-7.

Table 5
Stanine and Decile Values for Each of 24 Letters
(In Rank Order By Level)

Semester 2			Semester 4			Semester 4+		
Number	Stanine	Decile	Number	Stanine	Decile	Number	Stanine	Decile
17	3	1	9	3	1	16	3	1
8	3	1	17	3	1	8	3	1
9	3	2	7	3	2	17	3	2
16	3	2	8	3	2	24	3	2
7	3	3	10	3	3	7	3	3
24	3	3	24	4	3	9	3	3
10	4	3	16	4	3	4	4	3
12	4	4	21	4	4	23	4	4
13	4	4	12	4	4	5	4	4
21	4	5	13	5	5	1	5	5
19	5	5	19	5	5	18	5	5
5	6	6	18	6	6	21	6	6
23	6	6	5	6	6	10	6	6
18	6	6	1	6	6	19	6	6
4	6	7	23	6	7	20	6	7
1	6	7	15	7	7	2	7	7
22	7	8	4	7	8	13	7	8
15	7	8	22	7	8	12	7	8
20	7	8	3	7	8	11	7	8
11	7	9	20	7	9	22	7	9
14	8	9	11	8	9	15	8	9
2	8	10	2	8	10	3	8	10
3	9	10	14	8	10	6	9	10
6	9	10	6	9	10	14	9	10

Table 6
Stanine and Decile Values for Each of 24 Tables
(In Rank Order By Level)

Semester 2			Semester 4			Semester 4+		
Number	Stanine	Decile	Number	Stanine	Decile	Number	Stanine	Decile
10	3	1	23	3	1	11	3	1
11	3	1	24	3	1	10	3	1
7	3	2	21	3	2	7	3	2
19	3	2	7	3	2	12	3	3
16	3	3	19	3	3	2	3	3
12	3	3	10	3	3	16	3	3
23	3	3	16	3	3	19	4	3
21	3	4	12	4	4	21	4	4
2	4	4	8	5	4	8	4	4
8	4	5	2	5	5	23	4	5
24	4	5	11	5	5	24	5	5
1	7	6	14	6	6	17	6	6
17	7	6	6	7	6	1	6	6
9	7	6	18	7	6	9	7	6
13	7	7	1	7	7	20	7	7
3	7	7	9	7	7	13	7	7
20	7	8	22	7	8	3	7	8
4	7	9	4	7	8	4	7	8
6	7	9	13	7	8	22	7	8
22	7	9	3	7	9	15	7	9
14	7	9	5	7	9	18	8	9
5	8	10	15	8	10	5	8	10
18	8	10	20	8	10	6	8	10
15	8	10	17	8	10	14	8	10

Table 7
Stanine and Decile Values for Each of 16 Manuscripts
(In Rank Order By Level)

Semester 2			Semester 4			Semester 4+		
Number	Stanine	Decile	Number	Stanine	Decile	Number	Stanine	Decile
15	2	1	10	3	1	14	3	1
10	3	2	15	3	2	10	3	2
13	3	2	14	3	2	15	3	2
8	4	3	13	3	3	13	4	3
14	4	4	8	3	4	6	4	4
9	5	4	12	6	4	12	5	4
12	5	5	9	6	5	8	5	5
4	5	6	6	6	6	16	5	6
5	6	6	5	6	6	7	6	6
16	6	7	7	6	7	9	6	7
6	6	7	16	6	7	1	6	7
1	6	8	4	6	8	5	6	8
7	7	9	1	6	9	4	7	9
11	8	9	11	8	9	11	8	9
2	9	10	3	9	10	3	9	10
3	9	10	2	9	10	2	9	10

The stanine difficulty indices show few at middle difficulty (Stanine 5) with many at the extremes (Stanine 3 and 7-9). This distribution indicates that the tasks used represent the extremes of difficulty (low and high) rather than a normal distribution of difficulty.

It was originally anticipated that the relative difficulty of tasks might vary with amount of training; hence the computing and reporting of difficulty indices for each of the training levels separately (in Tables 5-7). However, the alternative hypothesis--that relative difficulty does not vary with amount of training--would, if true, permit the use of one set of difficulty indices applicable to all levels of training. To check on that alternative hypothesis, for each of the three levels of training, the two difficulty indices (stanine and decile) for each task were added. (Summing the two indices provided a more stable, and thus more reliable, measure of difficulty than would each index separately.) Then product-moment correlations were computed between the various training levels, with results as shown in Table 8, p. 22.

As shown in Table 8, the relative difficulty of the 24 letters among Semester-2 typists was virtually identical to the relative difficulty of those letters among Semester-4 typists (r = .96). For letters, it would appear that little imprecision would result if the same difficulty indices were used for both 2nd- and 4th-semester typists (presumably those for Semester 2, since most typists take one year of training). Correlations for letters between Semesters 2 and 4+ and between 4 and 4+ are somewhat lower (.77 and .71). Whether these correlations are considered high enough to justify one set of indices across all three training levels is an arbitrary decision.

Table 8
Correlations for Sum of Difficulty Indices Between Training Levels[a]
(By Class of Task)

Semester	Letters		Tables		Manuscripts	
	4	4+	4	4+	4	4+
2	.96	.77	.84	.97	.95	.83
4		.71		.74		.93

[a] N for Letters and Tables is 24; for Manuscripts, 16. All correlations are significantly different from zero at the .01 level.

Concerning tables, Table 8 shows almost identical difficulty of the 24 tables for Semester 2 and 4+ Ss (r = .97). Although the correlations for tables between Semesters 2 and 4 and between 4 and 4+ are lower (.84 and .74), a single set of difficulty indices might still be justified.

Concerning manuscripts, Table 8 shows a high r for Semester 2 and 4 typists (.95) and Semesters 4 and 4+ typists (.93) suggesting that a single set of difficulty indices might be sufficient. In addition, although somewhat lower, the correlation between semesters 2 and 4+ (.83) might justify the use of a single set of indices.

In summary, there is nothing to prevent the use of separate indices for each of the three levels of training. However, if agreement between training levels is judged to be sufficiently high (as measured by the correlations of Table 8), simplicity and economy are served by the use of a single set of indices across all training levels.

9. To enable the classroom teacher, and others, to make a direct prediction of the difficulty level of a particular task, multiple regression analysis was carried out using the difficulty index of the task as the criterion and the raw score values of the task characteristics as the predictor variables. The resulting multiple correlations and Beta weights are displayed in Tables 9-11 on pp. 23-25.

Examination of the Beta weights (Tables 9-11) permits identifying those task characteristics that contribute most to difficulty. For letters: increased letter length and a table in the letter make for high difficulty; on the other hand, listed enumerations and the length of the table (if there is one) contribute almost nothing to difficulty. For tables: length (i.e., number of words) and number of columns have large effects on difficulty; the other table variables have relatively little effect. For manuscripts: number of footnotes is influential; number of corrections is not. Some slight variations to these generalizations exist between training levels and depending on whether stanines or deciles are used.

Table 9

Multiple Correlations and Beta Weights for Letter Task Characteristics and Difficulty Indices (By Level, By Type of Index; df = 14)

Index	Semester	R[a]	Constant	Beta Weights[b]								
				X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9
Stanine	2	.995	2.78	.34	.02	- .78	- .31	.44	.05	.06	.08	3.08
Stanine	4	.992	3.20	-.13	-.23	.33	.41	-.45	- .12	.10	.86	2.96
Stanine	4+	.993	2.85	.47	-.15	2.14	-1.15	.28	.97	.01	- .17	1.47
Decile	2	.993	1.73	.62	-.46	.10	- .18	.10	- .29	.12	.60	4.37
Decile	4	.996	2.12	-.40	-.66	.94	1.29	-.19	- .29	.07	1.16	4.58
Decile	4+	.991	1.57	.87	.54	3.58	-1.90	.31	1.49	.00	- .59	2.20

[a] All multiple correlations are statistically different from zero at the .001 level.

[b] The variables are:

X_1 = Enclosures
X_2 = Listed Enumerations
X_3 = Table
X_4 = Column Heads
X_5 = Number of Columns
X_6 = Number of Column Heads Shorter than Columns
X_7 = Number of Words in Table
X_8 = Letter Form
X_9 = Letter Length

Table 10
Multiple Correlations and Beta Weights for Table Task Characteristics and Difficulty Indices
(By Level, By Type of Index; df = 17)

Index	Semester	R^a	Constant	Beta Weights[b]					
				X_1	X_2	X_3	X_4	X_5	X_6
Stanine	2	.995	1.95	.55	.41	-.25	-.17	-.20	3.83
Stanine	4	.992	4.72	.01	-1.23	.07	-.17	-.36	3.53
Stanine	4+	.992	1.23	.70	.53	-.19	-.07	.54	3.35
Decile	2	.985	-2.66	2.03	1.31	-.67	-.41	-.11	4.46
Decile	4	.988	6.26	- .50	-2.04	.48	-.63	-.69	5.11
Decile	4+	.990	-1.78	1.56	.57	-.25	-.14	.75	4.20

[a] All multiple correlations are statistically different from zero at the .001 level.

[b] The variables are:

X_1 = Number of Columns
X_2 = Column Headings
X_3 = Number of Single-Line Column Headings
X_4 = Number of Column Headings Shorter than the Column
X_5 = Braced Head
X_6 = Length of Table

An example follows to illustrate the use of the data of Tables 9-11. First, the task characteristics must be expressed in terms of their predictor values, as given in Tables 19-21. For example, a manuscript of 75 words uses the value 0; one of 150 words uses the value 1. Assume a handwritten manuscript of 75 words with 1 footnote and 7 corrections and that a difficulty index for this task in stanine form for Semester 2 is desired. The values to be inserted in the equation are: 0 for handwritten, 1 for the footnotes, 1 for the corrections, and 0 for the length. From Row 1 of Table 11 for Semester 2 stanines, the constant is 2.23, and the difficulty index is:

$$2.23 - .39(0) + 2.38(1) + .12(1) + .90(0) = 4.73$$

As an obtained difficulty index between whole numbers is always expressed to the next higher whole number, the 4.73 would be expressed as 5. In decile form for the same manuscript (Row 4 of Table 11 for Semester 2 deciles), the index would be:

$$1.30 - .95(0) + 2.91(1) + .16(1) + 2.19(0) = 4.37 = 5$$

A chief limiting feature in the application of the difficulty equations of this study to other tasks is the restriction, in this study, to two task lengths (75 or 150 words for letters and manuscripts, 37½ or 75 words for tables). Whether linear interpolation for other task lengths is permissible (e.g., a multiplier of ½ for a letter of 113 words--halfway between 75 and 150 words) is not known and is a matter for future investigation.

Table 11
Multiple Correlations and Beta Weights for Manuscript Task Characteristics and Difficulty Indices
(By Level, By Type of Index; df = 11)

Index	Semester	R^a	Constant	Beta Weights[b]			
				X_1	X_2	X_3	X_4
Stanine	2	.991	2.23	- .39	2.38	.12	.90
Stanine	4	.994	3.05	- .10	2.86	.01	.03
Stanine	4+	.979	3.17	-1.03	2.91	.11	- .79
Decile	2	.978	1.30	- .95	2.91	.16	2.19
Decile	4	.975	2.36	-2.27	3.77	.14	.55
Decile	4+	.983	2.70	-1.66	4.59	.15	-2.02

[a] All multiple correlations are statistically different from zero at the .001 level.

[b] The variables are:
X_1 = Type of Copy
X_2 = Number of Footnotes
X_3 = Number of Corrections
X_4 = Length of Manuscript

Performance Norms

Frequency distributions for each of the three criteria (by task and by level) were prepared, and percentiles were computed (Appendix A, Tables 25-51, pp. 48-74). These percentiles provide an initial pool of values for the eventual determination of standards on each of the three criteria for each of the 64 tasks. Example: A Semester-2 student completes letter #2 in 60 quarter minutes (15 minutes). Column 2 of Table 25 (p. 48) shows 60 lying between 58 and 64 quarter minutes, representing, respectively, the 6th and 5th deciles. The student's performance thus lies between the 50th and 60th percentiles. Assuming 3 typographical errors on that task, Table 34 (p. 57) shows that performance to be at the 64th percentile; 64 percent of the Semester-2 typists in this investigation made more than 3 typographical errors.

Performance Intercorrelations

Several series of intercorrelations were computed. In all cases, because of the skewed distributions, as reflected by the standard deviations in Tables 22-24, pp. 42-47, and because of restriction of range, the correlations are somewhat depressed.

Vocabulary and Straight-Copy Performance. Table 12 displays the Pearson product-moment correlation coefficients between the vocabulary scores and straight-copy speed and errors.

Table 12
Vocabulary and Straight-Copy Intercorrelations
(By Level)

Level (Semester)	N	Straight-Copy	
		Speed	Errors
2	1317	.103**	.005
4	1190	.088**	-.116**
4+	581	.306**	.101**
All Levels[a]	3088	.168**	-.010

[a] Correlations for "all levels" determined by _z_-transformation.

**p < .01.

The correlations across training levels range from .09 to .31 for speed and from -.12 to .10 for errors. Most of them differ significantly from zero because of the large _N_s on which they are based. Their absolute size shows, in corroboration of much earlier evidence, that simple copying skills at the typewriter are largely independent of intelligence (as inferred from vocabulary). Training in copying skills should be (as it is) available to all persons, and no consequential differences in proficiency should be expected to result from differences in intelligence of trainees.

Vocabulary and Office-Typing Task Intercorrelations. The range of _r_'s and the median _r_'s between vocabulary scores and each of the three criteria of office-typing proficiency are shown in Table 13. Although _r_'s were computed by level, differences were so small as to be of no practical or theoretical consequence. Accordingly, Table 13 displays the obtained _r_'s across levels, by class of task, and across levels and tasks.

Table 13
Vocabulary and Office-Typing Task Intercorrelations[a,b]
(Across Levels; By and Across Class)

Variable	Range		Median[c]	
	From	To	r	N
Letters				
Completion Time	-.322	.121	-.05	118
Typo. Errors	-.338	.117	-.09	113
Form Errors	-.279	.239	-.09	114
Tables				
Completion Time	-.331	.122	-.07	128
Typo. Errors	-.345	.101	-.11	114
Form Errors	-.501	.075	-.21*	110
Manuscripts				
Completion Time	-.271	.064	-.09	129
Typo. Errors	-.329	.171	-.10	104
Form Errors	-.447	.048	-.18*	96
Across Tasks				
Completion Time	-.322	.122	-.07	125
Typo. Errors	-.338	.171	-.10	110
Form Errors	-.501	.239	-.16*	107

[a] Signs of the correlations were considered in stating the range and the median correlations.

[b] The negative sign is an artifact of the measures used. As completion time and errors decrease, the vocabulary score increases (improves). Thus, negative correlations indicate that brighter students are speedier and more accurate office-task typists.

[c] Median _r_ is the average, by _z_-transformation, of the median _r_'s for each training level. Statistical significance of the _r_'s is impossible to determine accurately because of variation in _N_s. The _N_ shown is the average of the _N_s for the median _r_'s for each training level.

*$p < .05$.

The correlation coefficients of Table 13 range between -.50 (for form errors in tables) and .24 (for form errors in letters). Across tasks, the median _r_ for form errors (-.16) is higher than those for speed and typographical errors (-.07, -.10)--in accordance with logical expectations, since placement decisions reflect mental, not manipulative, processes.

At the same time, the obtained r's are lower than those of .50 to .60 found in some earlier studies and they are low in an absolute sense. For the low-ability Ss of this investigation, there appears to be little relationship between intelligence and office-typing proficiency.

There are several possible explanations for the low r's. One factor is the restriction in range of the closely bunched vocabulary test scores. In addition, in complex tasks individual differences increase with practice (Anastasi, 1934; Perl, 1934). Many of the tasks used go beyond anything included in the prior training of the high school and perhaps 2-year college Ss; they are low-ability Ss subjected to modest typing curricula. Thus, for many tasks, the amount of previous practice was zero or near-zero. The result is restriction of range in the typing scores, as well as in the vocabulary scores. The restriction in both variables depresses the obtained r's. In contrast, the earlier studies showing moderate r's mainly used simpler tasks--ones typically incorporated into earlier training; also, earlier Ss no doubt were more heterogeneous with respect to intelligence. Thus, in earlier studies, both variables had wide ranges.

The highly skewed distributions of typographical and form errors on the office tasks, as shown by the size of the standard deviations in relation to the means, is another contributor to the depressed correlations of the present investigation.

The correlations between intelligence and office-typing proficiency of some earlier studies (.50 to .60) that used heterogeneous Ss and test tasks of a type adequately practiced in the earlier training of Ss suggest that low-ability trainees ought not to be encouraged to undertake training beyond the level of clerk-typist. The obtained correlations of the present investigation, because of the extreme restriction of range that underlies them, probably should not be taken as contradicting the inference for training from the findings of earlier studies.

Straight-Copy Speed with Office-Task Completion Time. The range and median r's between straight-copy speed and completion time on the office tasks are shown in Table 14, p. 29.

The obtained correlations of Table 14 range between -.49 (for letters) and .12 (for tables). Again, negative signs are an artifact of the measures used and represent straight-copy speed related to office-task speed.

The median r's per class of task and across tasks (-.17, -.18, -.20 and -.18) are in the anticipated direction, but they are so low in an absolute sense as to suggest that office-task proficiency depends much more on matters relating to the placement of materials on the page than on keystroking speed, as measured in straight-copy tests. On the other hand, earlier studies (Muhich, 1967; West, 1960; West & Bolanovich, 1963) obtained r's between straight-copy speed and speed at office-tasks of .75, .48, and .70. It seems probable that the differences between the findings of the present investigation and earlier ones lie mostly in differences in the amount of earlier practice given to tasks of the kinds used. In these earlier studies (mostly of high-ability, senior college typists), adequate earlier training on the types of tasks used in the testing provided good mastery over matters of layout of materials on the page, permitting the role of sheer stroking speed to manifest itself. In the present investigation, all but the simplest test tasks were novel ones to the low-ability *S*s who were used. Most of their test time necessarily was devoted to decision-making on matters of layout.

Table 14
Correlations between
Straight-Copy Speed and Office-Typing Completion Time[a]
(Across Levels; By and Across Tasks)

Class of Task	Range		Median[b]	
	From	To	r	N
Letters	-.486	-.007	-.17	90
Tables	-.416	.117	-.18*	115
Manuscripts	-.430	.110	-.20*	98
Across Tasks	-.486	.117	-.18*	101

[a] Signs of the correlations were considered in stating the range and the median correlations.

[b] Median r is the average, by z-transformation, of the median r's for each training level. Statistical significance of the r's is impossible to determine accurately because of variation in *N*s. The *N* shown is the average of the *N*s for the median r's for each training level.

*$p < .05$.

If these hypotheses are tenable ones, a summary inference about office-task proficiency and training for such proficiency would be: Stroking speed as measured by straight-copy tests contributes to office-task speed only after reasonable mastery over matters of placement of materials on the page has been established. Accordingly, training in matters of placement has first priority. The preeminence of placement factors over keystroking factors applies, as well, to the high-ability *S*s of Muhich's study (1967), in which decision-making was found to play an increasingly larger role in office-task proficiency (in relation to that of stroking skills) as amount of training increased. The trivial role of stroking speed among the low-ability *S*s of the present investigation reinforces the conclusions that the traditional heavy focus on stroking speed is mistaken and that the heart of office-task proficiency is decision making about matters of placement. Only when planning processes have been mastered does stroking speed play a nontrivial role in proficiency at realistic typing tasks.

Intertask Correlations. Correlations were computed for all possible pairs among the 64 office tasks, with widely varying *N*s for the various pairs. For those pairs for which *N* was at least 10, the r was computed for completion time, typographical errors, and form errors; statistical significance was based on the median r and the mean *N*. Differences among levels were found to be few and small in size. Accordingly, findings are presented across levels in Tables 15-17.

The median intercorrelations for completion time are displayed in Table 15. Ns (footnoted) are the average number of Ss for the correlations used.

Table 15
Median Intercorrelations for Office-Task Speed[a]
(Across Levels)

Class of Task	Class of Task		
	Letters	Tables	Manuscripts
Letters	.24	.19	.26*
Tables		.19	.29**
Manuscripts			.32*

[a] The mean Ns from left to right for the "Letters" row were 37, 43, 41; for "Tables," 51, 64; for "Manuscripts," 36.

*p < .05. **p < .01.

The data of Table 15 make apparent that both intratask and intertask relationships are modest in size. There is about as much difference between some letters and other letters as there is between letters and manuscripts. Although there was a wide range of r's for the possible pairs among the 64 tasks, the moderate median r's of Table 15 show that transfer of skills within and between classes of tasks is modest--so that explicit training and practice must be devoted to the various features of various tasks. Substantially the same inferences for training apply to typographical and to form errors, as is evident from the data of Tables 16 (below) and 17 (p. 31). Again, Ns are the average number of Ss for the correlations used.

Table 16
Median Intercorrelations
For Office-Task Uncorrected Typographical Errors[a]
(Across Levels)

Class of Task	Class of Task		
	Letters	Tables	Manuscripts
Letters	.33*	.29*	.25
Tables		.26*	.41**
Manuscripts			.38**

[a] The mean Ns from left to right for the "Letters" row were 37, 43, 41; for "Tables," 51, 64; for "Manuscripts," 36.

*p < .05. **p < .01.

Table 17
Median Intercorrelations for Office-Task Form Errors[a]
(Across Levels)

Class of Task	Class of Task		
	Letters	Tables	Manuscripts
Letters	.39**	.24	-.01
Tables		.44**	.31**
Manuscripts			.41**

[a] The mean Ns from left to right for the "Letters" row were 37, 43, 41; for "Tables," 51, 64; for "Manuscripts," 36.

**$p < .01$.

The intratask and intertask correlations of Tables 15-17 imply only moderate transfer of skills among tasks. However, the correlations might reflect the conventional training practice of treating each type of task as unique. It is conceivable that higher correlations would result were attention focussed on those processes that are common across tasks; that is, were there to be deliberate "teaching for transfer,"--deliberate pointing to the commonalities among task processes.

Office-Task Speed-Error Intercorrelations. For each of the 64 tasks, completion time was correlated with uncorrected typographical errors and form errors. Findings are displayed in Table 18, below.

Table 18
Speed-Error Intercorrelations for Office Tasks[a]
(Across Levels)

Variable	Range		Median[b]	
	From	To	r	N
Letters				
Typo. Errors	-.272	.358	-.02	135
Form Errors	-.204	.327	-.02	128
Tables				
Typo. Errors	-.218	.188	-.01	139
Form Errors	-.281	.278	.06	126
Manuscripts				
Typo. Errors	-.215	.232	.02	118
Form Errors	-.246	.369	.05	114
Across Tasks				
Typo. Errors	-.272	.358	.00	131
Form Errors	-.281	.369	.03	123

[a] Signs of the correlations were considered in stating the range and the median correlations.

[b] Median r is the average of the median r's for each training level. The N shown is the

Negative correlations in Table 18 mean that as the task took longer to complete, errors were reduced; the typist who is careful about the arrangement of his work and who proofreads it to identify stroking errors to be corrected needs more time for the task. Positive correlations mean that time and errors go together; the faster typists are the more accurate ones. Both types of performances (i.e., positive and negative correlations) are evident in the two middle columns of Table 18. The median r's of the right-hand column of Table 18, however, do not differ significantly from zero. Typists at all speeds are found at all error levels and vary in their readiness to proofread and to correct correctible misstrokes. For these low-ability Ss, faster speeds do not go with higher quality work. Speed and quality of office-task work are based on different underlying variables and require separate attention in training.

Summary of Correlational Data. The inferences from the data of Tables 12-18, considered in the light of earlier research findings, are:

1. Because straight-copy skills are unrelated to intelligence, training for low-level copying tasks can be provided to all students, regardless of intelligence.

2. Because of restriction of range partly attributable to the novelty of many of the test tasks, the low correlations between intelligence (i.e., vocabulary) and office-task proficiency of the present investigation should probably not be taken to contradict the inference from the moderate correlations found in earlier studies of heterogeneous Ss who had adequate prior training on tasks like the test tasks. Low-ability students, without special training, may be unable to carry out the more complex typing tasks.

3. Stroking speed, as measured in straight-copy tests, contributes moderately to speed at office tasks only after good mastery over matters of placement of materials on the page has been established. Even then, decision-making plays a larger role than manipulative skills and suggests that the conventional focus on stroking skills is mistaken and should be replaced by greater attention to the placement features of realistic typing tasks.

4. Modest intercorrelations among various types of office tasks at varying levels of complexity show that there is little transfer of skills across tasks. Deliberate teaching for transfer might increase the correlations. At the same time, intrinsic differences between tasks are sufficient to require deliberate instructional attention to the particular features of particular tasks.

5. Among trainees in this and earlier studies, speed and quality of work were uncorrelated and, inferentially, are based on different underlying variables. The two features of performance require separate instructional attention.

Conclusions and Recommendations

The present investigation provides equations (a) for making valid estimates of the difficulty of three major classes of office-typing tasks (business letters, tables, manuscripts from draft copy) for trainees completing 1, 2, and 2+ years of formal typing instruction and (b) for constructing typing tasks at specified levels of difficulty, based on the internal features of the tasks.

The difficulty indices (in stanine and decile form) resulting from the equations permit the eventual establishment of standards and norms for trainees and job applicants--on tasks of known difficulty. To that end, the present investigation also provides decile norms for speed and percentile norms for each of two major classes of errors (form errors and uncorrected typographical errors) on each of the 64 tasks of the present battery. These norms apply to the low-ability trainees of this study and provide an initial basis for the establishment of more broadly based norms.

Although separate equations are provided for each of the three training levels (1, 2, and 2+ years), the predicted scores among levels are so highly intercorrelated that there appears to be little risk in using one set of equations across all three training levels--presumably those for typists completing the one year of training that applies to 70 percent of all trainees in this country.

Among the various task features, inspection of the obtained Beta weights identifies those features that do and do not contribute appreciably to difficulty. For business letters, increased length and a table in the letter make for high difficulty; on the other hand, listed enumerations and the length of the table (if any) contribute little to difficulty. For tables, length (number of words) and number of columns have large effects; the other table variables (e.g., type of column headings) have relatively little effect. For manuscripts, number of footnotes is influential; number of corrections is not.

Correlational data on intelligence in relation to typing proficiency support the standard practice of offering beginning typewriting to all persons, but leave uncertain the propriety of offering advanced instruction to low-ability trainees. Although deliberate teaching for transfer might increase relationships in scores among office-typing tasks, the low to moderate correlations found here suggest the need to offer specific training in particular typing tasks. Finally, and most important, low relationships between straight copy and office-typing proficiency are in accord with earlier studies and confirm the desirability of reducing the conventional heavy focus on ordinary stroking skills and of increased and earlier attention to realistic office-typing tasks and to the decision processes applicable to the layout of such tasks on the page.

Recommendations

1. Two chief limitations of the present study are (a) the use of only two task lengths: 75- and 150-word letters and manuscripts and $37\frac{1}{2}$- and 75-word tables; and (b) indices and performance norms based mostly on low-ability trainees whose prior training was largely confined to simple tasks, not including the more difficult ones of the present investigation.

Accordingly, it would be desirable to investigate the effects on difficulty of a larger variety of task lengths as applied to heterogeneous students (i.e., wider range of ability) whose prior training included tasks at varying levels of difficulty. Performance norms for heterogeneous students are also desirable.

2. If it is possible to gain access to a sufficiently large sample of employed typists and to enlist their cooperation, Recommendation No. 1 is applicable to such typists also.

3. Replication of the present investigation, using the present tasks applied to a new sample of examinees, and also to employed typists, would assist in establishing the generalizability of the present findings.

4. The extent to which the more difficult typing tasks make demands on intelligence is as yet uncertain. Investigations using samples of students whose range of intelligence and typing performance scores is not restricted could determine whether it is desirable to screen out less apt students from advanced typewriting training. [However, improved instructional methods and materials specifically geared to students of low ability might reduce the intellectual demands of advanced typing tasks.]

5. Although not to be encouraged, many teachers evaluate only quality, not speed, of performance at office-typing tasks. To assist such teachers, canonical analysis using two criterion measures (form errors and uncorrected typographical errors) would be helpful.

6. Testing for significant differences in performance scores following various amounts of training would reveal the returns from additional training. If the absolute differences (between first- and second-year high school typists) are as modest as those of the present investigation, reexamination of the typing curriculum and methodology would be indicated.

7. Other types of tasks (e.g., forms, invoices) and other task features (e.g., incidence of numbers and special characters in the test tasks) could be investigated.

Additional recommendations relate to the methodology of canonical correlation analysis, as follows:

8. Because the particular canonical weights are a function of the particular components included in each test item, cross-validation of the present indices, using new tasks and a new sample of examinees, is desirable in order to confirm the relative weights contained in the present canonical equations. Such a cross-validation should again assign variables at random to the test items.

9. Study of the effects of various criteria for eliminating predictor variables from canonical analysis might be undertaken. A stepwise analysis of canonical weights might show that variables could be eliminated without seriously affecting the predictive ability of the canonical equations. This recommendation is supported by the high individual predictor-criterion intercorrelations of the present study.

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Appendices

		Pages
A.	Supplementary tables, 19-51	39-74
B.	Typing tasks	
	Straight copy timing	75
	Office-typing tasks	76-134

Table 19
Task Variations in Business Letters[1]

Letter Number	Variable Number*								
	1	2	3	4	5	6	7	8	9
1	1	0	0	0	0	0	00	0	1
2	1	0	1	1	3	0	28	0	1
3	1	1	1	0	4	0	29	0	1
4	0	0	0	0	0	0	00	1	1
5	0	1	0	0	0	0	00	0	1
6	0	0	1	1	4	2	39	0	1
7	1	0	0	0	0	0	00	0	0
8	0	0	0	0	0	0	00	0	0
9	1	1	0	0	0	0	00	0	0
10	1	0	1	0	2	0	08	0	0
11	0	0	1	0	2	0	21	0	1
12	1	0	1	1	2	2	17	0	0
13	0	0	1	1	3	2	22	0	0
14	0	0	1	1	3	3	31	0	1
15	1	0	1	0	2	0	11	0	1
16	0	0	0	0	0	0	00	1	0
17	0	1	0	0	0	0	00	0	0
18	1	1	0	0	0	0	00	0	1
19	1	0	1	1	3	1	22	0	0
20	0	1	1	1	3	0	18	0	1
21	0	0	1	0	3	0	19	0	0
22	0	1	1	0	2	0	17	0	1
23	0	0	0	0	0	0	00	0	1
24	1	0	0	0	0	0	00	1	0

*1: Enclosures (1 = with, 0 = without)
2: Listed Enumerations (1 = with, 0 = without)
3: Table (1 = with, 0 = without)
4: Column Heads (1 = with, 0 = without)
5: Number of Columns
6: Number of Column Heads Shorter than Columns
7: Number of Words in Table
8: Letter Form (1 = prearranged, 0 = unarranged)
9: Letter Length (1 = 150 words, 0 = 75 words)

[1] To illustrate the reading of these tables (19-21): in table 19, a "1" in column 1 means that the letter has an enclosure. A "1" in column 9 would mean that the letter has 150 words. It is also apparent from these tables that some columns are dependent on preceding columns. For example, the presence of a "0" in column 3, indicating that the letter does not contain a table, automatically requires a "0" in each of the following columns pertaining to the characteristics of the table contained within the letter.

Table 20
Task Variations in Tables

Table Number	Variable Number*					
	1	2	3	4	5	6
1	2	1	1	2	0	1
2	3	0	0	0	0	0
3	3	1	2	0	1	1
4	4	1	3	2	0	1
5	5	1	5	0	0	1
6	5	1	5	3	1	1
7	2	1	0	2	0	0
8	4	0	0	0	0	0
9	3	1	2	2	0	1
10	2	1	1	2	0	0
11	2	0	0	0	0	0
12	3	1	3	0	0	0
13	4	1	4	2	0	1
14	5	1	4	4	1	1
15	4	0	0	0	0	1
16	3	1	2	2	0	0
17	2	0	0	0	0	1
18	4	1	1	2	0	1
19	3	1	3	1	1	0
20	3	0	0	0	0	1
21	3	1	2	1	1	0
22	4	1	3	2	0	1
23	5	1	5	5	0	0
24	4	1	1	1	1	0

*1: Number of Columns
2: Column Headings (1 = with, 0 = without)
3: Number of Single-Line Column Headings
4: Number of Column Headings Shorter than the Column
5: Braced Head (1 = with, 0 = without)
6: Length of Table (1 = 75 words, 0 = 37½ words)

Table 21
Task Variations in Manuscripts

Manuscript Number	Variable Number*			
	1	2	3	4
1	0	1	07	1
2	0	2	07	1
3	1	2	14	1
4	0	1	07	0
5	1	1	14	0
6	1	1	07	1
7	1	1	14	1
8	0	0	14	0
9	1	1	07	0
10	1	0	07	0
11	1	2	07	1
12	1	1	00	1
13	0	0	07	0
14	1	0	14	1
15	0	0	00	0
16	0	1	00	1

*1: Type of Copy (1 = mixed type and longhand, 0 = handwritten)
2: Number of Footnotes
3: Number of Corrections
4: Length of Manuscript (1 = 150 words, 0 = 75 words)

Table 22
Means and Standard Deviations of Semester-2 Students
On Each of 64 Production Tasks

Task Number	N	Completion Time (1/4 minutes)		Typographical Errors		Form Errors	
		Mean	SD	Mean	SD	Mean	SD
Letter							
1	142	59.94	26.36	5.09	4.79	4.20	2.24
2	76	69.13	25.94	6.99	6.89	9.16	3.80
3	72	76.57	33.16	7.14	5.98	9.64	4.07
4	159	62.42	29.85	5.58	5.29	3.64	2.25
5	85	66.09	35.55	4.67	4.34	5.00	2.61
6	63	85.98	33.92	7.22	5.82	11.71	4.16
7	174	46.46	21.69	4.11	3.38	3.93	2.36
8	156	40.01	24.62	2.17	2.65	3.88	2.12
9	113	38.20	18.39	2.30	2.14	4.60	2.27
10	123	44.11	16.87	3.61	3.53	5.18	2.49
11	113	68.26	26.34	6.28	6.16	5.06	2.74
12	126	52.52	25.34	2.52	2.42	7.36	2.52
13	100	51.94	22.49	2.65	2.70	8.13	3.06
14	95	71.38	24.82	5.24	3.94	9.06	3.82
15	98	73.07	29.49	5.64	4.12	5.08	2.40
16	178	43.03	24.42	1.87	2.34	3.36	2.03
17	124	46.11	22.30	2.39	2.75	5.44	2.57
18	81	59.94	30.95	4.02	4.05	4.59	2.57
19	102	55.40	22.96	3.06	2.96	9.47	3.88
20	104	74.05	28.60	3.73	4.11	8.70	3.37
21	98	49.77	24.63	2.43	2.60	5.96	2.62
22	80	66.46	26.31	5.71	5.59	7.85	2.71
23	94	60.89	33.25	6.05	5.53	4.21	2.20
24	69	46.16	27.36	3.07	3.23	5.35	2.55
Table							
1	90	56.94	22.35	2.38	2.57	5.17	2.35
2	96	38.55	21.00	1.31	1.59	3.43	1.96
3	108	61.71	26.07	2.71	3.22	6.51	2.45
4	125	64.96	28.60	3.43	3.77	8.08	3.27
5	74	65.74	30.65	2.45	2.83	6.38	3.13
6	96	70.24	36.09	3.24	3.43	11.34	5.27
7	110	49.33	32.31	0.87	1.20	4.49	2.13
8	99	45.42	27.85	1.47	1.90	5.59	2.18
9	108	58.56	25.95	2.80	3.07	7.25	2.61
10	118	35.26	17.05	0.70	1.32	4.77	1.77

Table 22 (Continued)

Task Number	N	Completion Time (1/4 minutes)		Typographical Errors		Form Errors	
		Mean	SD	Mean	SD	Mean	SD
Table							
11	125	36.72	20.05	2.14	2.99	2.00	1.47
12	136	40.31	18.61	0.83	1.11	4.49	2.15
13	91	62.62	23.60	1.97	2.73	7.97	3.11
14	94	69.38	28.15	2.81	3.49	9.16	3.78
15	115	53.45	24.06	3.25	3.66	3.69	2.65
16	130	52.35	28.87	2.03	1.76	6.30	2.75
17	139	44.77	18.29	1.94	2.87	2.27	1.38
18	90	65.16	29.80	2.68	3.14	9.59	3.60
19	102	44.92	24.69	0.79	1.34	6.43	2.46
20	146	51.99	20.75	3.30	3.69	2.58	1.78
21	75	46.69	23.36	1.96	1.53	6.47	2.63
22	137	62.36	26.64	3.51	4.05	7.91	3.47
23	111	43.69	23.09	1.14	1.38	6.00	3.35
24	98	56.84	24.53	1.20	1.62	10.76	3.32
Manuscript							
1	81	59.37	28.49	5.64	4.55	9.83	2.85
2	54	57.44	18.36	5.54	6.17	10.02	3.72
3	81	60.58	25.67	5.83	5.19	12.11	4.40
4	91	38.00	19.70	3.19	2.76	9.29	3.12
5	67	45.94	22.47	3.52	2.80	9.01	3.75
6	51	56.14	20.67	4.67	3.50	7.14	2.80
7	78	59.78	24.44	6.09	5.09	10.40	4.44
8	149	48.89	22.40	3.76	3.07	5.40	2.56
9	126	50.95	26.85	2.24	2.07	9.56	3.10
10	131	43.26	20.65	2.96	3.24	4.20	2.11
11	71	60.32	26.32	6.35	5.26	10.06	4.20
12	129	56.86	25.64	4.88	4.57	7.86	3.11
13	161	46.34	22.06	1.96	2.63	5.50	3.65
14	117	67.30	24.68	4.56	5.06	4.63	3.38
15	139	39.19	20.90	2.02	2.82	3.04	1.70
16	129	60.87	33.34	5.69	5.23	9.38	2.39

Table 23
Means and Standard Deviations of Semester-4 Students
On Each of 64 Production Tasks

Task Number	N	Completion Time (1/4 minutes)		Typographical Errors		Form Errors	
		Mean	SD	Mean	SD	Mean	SD
Letter							
1	138	50.68	19.34	3.52	3.50	3.29	1.91
2	82	64.83	22.83	5.15	4.75	6.95	3.36
3	101	62.58	24.34	5.53	5.61	7.14	3.39
4	167	55.76	20.73	3.79	3.32	3.00	1.92
5	98	50.83	20.41	3.84	4.44	4.01	3.09
6	81	79.49	35.79	6.00	4.68	8.72	4.33
7	151	43.93	25.46	3.19	2.70	3.44	1.92
8	155	38.30	17.49	2.26	6.67	3.52	1.88
9	110	35.15	15.01	1.81	1.80	4.35	2.63
10	114	40.25	18.76	2.90	2.42	4.25	2.10
11	101	60.78	24.75	3.57	4.13	4.05	2.38
12	111	47.23	24.06	2.01	2.12	7.09	8.23
13	106	49.03	19.39	2.31	2.23	8.12	7.69
14	78	67.19	28.13	3.38	3.24	6.51	3.30
15	87	60.60	24.84	4.49	3.99	4.17	1.86
16	182	40.08	19.18	1.27	1.80	2.84	1.67
17	132	40.78	18.32	2.20	2.47	4.55	2.53
18	86	49.98	21.42	3.10	3.25	3.62	2.28
19	115	52.90	25.70	2.18	2.25	7.19	3.07
20	111	65.41	26.38	2.81	3.18	7.21	3.23
21	106	41.44	17.91	2.04	2.76	5.87	2.46
22	92	61.62	26.55	4.01	3.43	6.76	2.65
23	156	54.77	22.79	3.55	3.19	3.46	2.20
24	139	42.22	17.68	2.41	4.80	4.23	2.12
Table							
1	114	48.68	23.48	1.34	2.06	5.25	2.54
2	107	35.38	15.62	1.12	1.91	3.25	1.77
3	130	55.98	22.91	1.75	2.02	5.47	2.15
4	140	62.94	28.47	2.14	2.98	6.81	3.08
5	103	54.14	22.67	1.56	2.19	5.38	2.95
6	111	66.59	29.57	2.69	4.98	9.49	4.95
7	127	40.20	19.85	0.63	1.12	4.08	2.31
8	115	39.66	23.17	1.28	3.88	5.12	2.34
9	107	57.74	25.28	1.75	2.12	6.48	3.00
10	123	34.43	24.79	0.73	1.56	4.41	2.00

Table 23 (Continued)

Task Number	N	Completion Time (1/4 minutes)		Typographical Errors		Form Errors	
		Mean	SD	Mean	SD	Mean	SD
Table							
11	149	29.84	11.77	2.26	7.76	2.34	4.06
12	145	38.46	19.71	1.09	7.50	3.91	2.38
13	101	58.34	26.59	2.25	6.26	7.26	3.95
14	116	62.68	27.80	1.68	2.88	7.71	3.49
15	128	52.97	22.20	3.48	10.39	3.14	3.88
16	142	45.47	22.71	1.85	2.31	6.23	5.58
17	154	45.71	22.80	1.60	2.55	2.44	1.33
18	99	63.17	24.22	1.99	2.28	8.18	3.15
19	113	43.17	23.45	0.47	0.74	5.55	2.28
20	151	48.83	20.46	2.73	3.15	2.55	1.30
21	109	43.20	20.74	2.55	8.12	6.23	3.17
22	141	56.94	22.47	2.66	4.97	6.73	5.83
23	143	39.50	18.90	0.71	1.25	5.16	3.42
24	106	51.37	22.71	0.54	1.14	8.81	3.55
Manuscript							
1	122	59.89	25.24	4.52	3.34	9.47	3.54
2	94	53.57	21.31	4.72	4.40	9.44	4.08
3	101	62.27	23.23	4.51	3.95	10.78	4.64
4	106	35.64	14.46	2.72	2.45	8.18	3.34
5	92	47.86	24.86	3.02	3.26	8.54	3.21
6	98	50.63	21.58	4.20	3.53	7.57	3.25
7	100	60.83	23.21	4.14	3.24	9.09	4.14
8	166	45.39	21.04	2.69	2.62	4.46	1.88
9	139	39.58	18.94	1.99	1.95	8.27	3.25
10	165	41.58	18.39	2.27	1.94	3.69	2.02
11	88	58.03	19.61	4.65	4.27	9.14	3.93
12	152	54.51	23.57	3.49	4.08	7.76	6.73
13	188	49.49	23.91	1.19	1.73	4.58	3.41
14	142	59.62	22.44	2.60	2.57	3.96	4.81
15	164	40.04	19.98	1.50	1.80	2.95	1.62
16	159	52.87	22.68	3.87	3.99	8.87	3.11

Table 24
Means and Standard Deviations of Semester-4 Students On Each of 64 Production Tasks

Task Number	N	Completion Time (1/4 minutes)		Typographical Errors		Form Errors	
		Mean	SD	Mean	SD	Mean	SD
Letter							
1	101	32.50	9.66	0.89	1.21	1.07	1.09
2	73	46.74	15.97	1.26	1.90	2.92	2.01
3	79	46.02	14.61	1.42	1.36	2.60	1.76
4	104	35.15	12.20	1.16	1.41	1.00	0.98
5	107	34.37	12.21	0.24	0.83	7.44	4.43
6	88	58.24	20.56	1.17	1.37	3.59	2.63
7	95	25.78	9.43	1.08	1.40	1.79	1.03
8	119	23.35	11.51	0.86	1.08	1.71	1.03
9	100	24.68	15.26	0.59	0.91	2.57	3.11
10	121	30.82	26.06	1.46	1.54	2.86	5.23
11	116	42.72	24.86	1.23	1.66	1.72	3.04
12	113	35.90	21.91	0.93	1.35	3.97	5.36
13	129	42.40	23.10	1.17	1.73	4.88	5.68
14	131	47.26	15.62	1.46	1.92	3.41	6.10
15	126	37.75	13.20	1.48	1.66	1.36	1.09
16	127	23.34	9.86	0.54	1.15	1.54	1.17
17	134	27.52	12.91	0.93	2.02	1.90	1.39
18	143	37.26	19.31	0.98	1.68	1.50	1.41
19	124	38.22	13.68	0.71	1.19	3.75	1.93
20	132	47.47	18.30	0.78	0.98	3.21	2.26
21	121	32.07	13.62	0.77	1.13	2.98	1.48
22	140	42.06	13.73	1.31	1.78	2.98	1.66
23	141	32.67	12.00	1.09	1.57	1.09	0.93
24	112	29.70	24.25	0.81	1.61	2.03	1.52
Table							
1	153	30.85	7.81	0.78	1.21	3.03	1.82
2	154	20.71	8.64	0.48	0.88	2.07	1.52
3	166	42.32	13.47	0.98	1.12	3.52	1.90
4	172	46.26	17.27	1.16	1.23	4.88	2.35
5	143	37.62	11.14	0.66	1.01	3.16	2.34
6	144	49.99	18.89	0.74	1.02	7.24	7.11
7	153	28.90	11.28	0.28	0.96	2.65	2.66
8	153	27.02	12.17	0.32	0.67	3.82	2.26
9	157	34.38	13.67	0.65	1.29	4.09	2.36
10	156	23.30	9.30	0.26	0.88	3.10	1.39

Table 24 (Continued)

Task Number	N	Completion Time (1/4 minutes)		Typographical Errors		Form Errors	
		Mean	SD	Mean	SD	Mean	SD
Table							
11	169	22.00	9.28	0.34	0.95	1.22	1.19
12	170	27.19	10.22	0.16	0.47	2.34	1.68
13	161	38.41	13.96	0.45	0.82	4.75	2.99
14	166	46.29	17.65	0.63	1.20	5.38	2.87
15	153	37.22	13.26	1.10	1.90	1.78	1.55
16	150	29.78	11.27	1.03	0.97	3.41	2.39
17	151	27.05	9.45	0.46	0.92	1.57	1.02
18	151	42.50	15.46	0.62	1.00	5.14	2.50
19	155	31.21	12.37	0.25	0.55	3.77	1.86
20	160	35.84	19.17	1.16	1.56	1.72	1.14
21	152	25.52	9.33	1.06	1.74	3.63	1.81
22	157	40.85	14.00	1.15	2.50	3.89	2.22
23	155	30.76	12.78	0.51	4.03	2.85	2.00
24	155	37.95	14.68	0.16	0.50	5.87	2.69
Manuscript							
1	111	35.95	10.42	1.55	1.69	3.01	1.81
2	91	40.27	13.51	1.37	1.82	4.16	6.31
3	136	44.34	12.01	1.16	1.64	4.14	2.95
4	107	25.25	8.57	0.94	1.17	3.37	1.77
5	138	30.90	12.35	1.53	7.65	3.52	2.51
6	107	38.75	19.33	1.42	1.33	3.59	1.98
7	120	37.50	12.35	1.29	1.61	3.59	2.36
8	134	32.59	13.79	0.73	0.91	2.46	1.60
9	128	23.55	9.56	0.80	0.86	2.73	2.06
10	139	26.07	9.49	1.29	2.79	1.70	1.52
11	120	39.63	13.34	1.26	1.23	3.14	2.06
12	130	32.59	13.59	0.98	1.49	2.92	2.13
13	113	26.70	11.93	0.21	0.49	1.88	1.37
14	112	41.58	15.96	0.72	1.21	1.60	1.70
15	133	22.34	11.50	0.39	0.65	1.70	1.14
16	94	33.72	8.48	1.22	1.47	3.06	1.76

Table 25
Deciles for Letter Completion Time, Semester 2
(To the Nearest Quarter Minute)

Decile*	Letter Number																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
10	19	30	29	20	25	28	15	12	14	18	27	11	22	33	30	14	12	22	23	26	20	34	23	14
9	33	41	39	30	36	48	23	18	22	25	37	28	28	46	41	19	22	32	29	39	22	38	32	19
8	38	48	45	38	44	59	29	21	25	29	46	32	33	50	46	24	28	39	34	48	30	45	35	23
7	43	53	54	43	47	69	32	25	28	32	51	39	38	55	55	28	33	42	39	58	35	49	40	30
6	48	58	59	50	49	72	37	29	30	38	58	42	43	60	60	33	37	46	46	62	39	55	44	33
5	53	64	67	54	56	80	41	34	33	41	64	47	47	64	65	37	41	51	51	69	45	60	51	37
4	58	69	82	61	62	87	46	39	36	46	70	51	51	71	74	41	47	58	58	76	48	65	58	47
3	65	76	90	70	72	90	55	43	41	50	76	58	58	77	81	47	51	62	62	85	55	73	66	55
2	81	82	99	81	86	107	62	53	46	53	87	64	65	89	93	55	59	69	72	94	62	81	73	63
1	95	99	115	104	102	128	76	64	56	62	105	84	78	104	116	73	78	98	84	107	82	96	105	74
0	173	163	166	162	288	205	146	137	141	113	163	167	137	151	160	191	140	174	154	169	133	177	188	154
N	142	76	72	159	85	63	174	156	113	123	113	126	100	95	98	178	124	81	102	104	98	80	94	69

*The decile values at 0 and 10 identify the range of scores.

Table 26
Deciles for Letter Completion Time, Semester 4
(To the Nearest Quarter Minute)

Decile*	Letter Number																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
10	17	28	22	22	18	27	13	10	11	11	25	20	18	31	20	10	14	17	17	27	16	28	20	13
9	29	38	39	30	30	39	22	20	20	20	34	26	29	41	33	20	23	27	28	37	24	35	28	24
8	35	43	42	36	36	49	27	23	22	25	41	29	33	45	41	25	27	35	33	46	29	41	37	27
7	39	49	47	43	39	58	31	27	26	30	44	34	36	50	46	27	30	38	37	50	33	45	42	32
6	44	55	52	48	42	63	34	31	29	32	51	37	39	55	50	31	34	40	41	56	35	50	45	34
5	47	64	58	53	44	69	39	34	32	34	55	41	45	59	54	36	37	45	46	61	38	55	50	37
4	51	72	63	59	49	78	44	38	35	39	60	46	51	67	60	41	41	51	50	67	41	59	53	41
3	56	75	69	63	53	92	49	43	38	45	67	50	55	75	66	47	44	56	59	71	44	69	60	47
2	62	80	77	70	62	109	56	50	44	52	76	57	61	80	79	54	49	60	67	78	48	78	72	54
1	75	88	88	80	80	134	65	64	53	67	99	75	74	94	91	62	58	66	84	92	57	94	85	67
0	121	155	158	126	114	187	234	95	104	111	146	191	120	194	168	130	148	156	160	215	141	189	153	111
N	138	82	101	167	98	81	151	155	110	114	101	111	106	78	87	182	132	86	115	111	106	92	156	139

*The decile values at 0 and 10 identify the range of scores.

Table 27
Deciles for Letter Completion Time, Semester 4+
(To the Nearest Quarter Minute)

Decile*	Letter Number 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
10	16	23	19	16	15	26	9	11	10	12	19	12	18	21	11	11	10	15	13	22	10	22	14	11
9	21	30	30	23	22	34	15	14	14	16	26	21	23	31	24	13	15	23	23	29	19	26	19	15
8	24	35	35	25	25	39	19	15	15	19	31	24	28	35	28	16	18	26	25	34	22	30	21	16
7	27	38	39	28	27	44	21	17	18	20	34	26	30	37	29	17	20	27	28	37	23	33	24	19
6	29	40	40	30	30	51	22	18	20	22	36	28	33	41	32	18	22	29	31	40	25	36	26	21
5	31	43	42	32	31	55	23	20	22	23	38	30	35	44	35	20	23	32	35	43	28	38	29	23
4	34	47	44	34	33	60	26	22	23	27	41	33	38	46	37	23	24	34	37	45	31	40	32	25
3	36	50	49	39	36	66	27	25	26	29	42	37	42	51	40	25	27	37	42	49	34	44	37	30
2	38	53	55	42	41	72	30	27	29	32	47	41	49	56	42	29	34	40	46	59	38	49	42	34
1	44	65	65	47	47	88	36	34	35	39	53	53	61	62	48	32	44	49	54	68	47	60	48	43
0	72	105	103	93	82	113	68	77	123	65	77	71	120	113	107	56	77	92	104	104	99	93	71	87
N	101	73	79	104	107	88	95	119	100	121	116	113	129	131	126	127	134	143	124	132	121	140	141	112

*The decile values at 0 and 10 identify the range of scores.

Table 28

Deciles for Table Completion Time, Semester 2

(To the Nearest Quarter Minute)

Decile*	Table Number																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
10	12	14	15	20	17	12	14	15	15	12	11	12	15	20	20	12	14	12	16	15	11	18	15	16
9	34	19	34	35	30	31	24	19	34	19	19	22	38	38	29	24	25	34	22	31	26	36	21	29
8	40	22	39	41	43	44	28	26	38	23	21	26	44	45	35	31	31	40	26	36	29	42	26	36
7	44	27	46	47	48	48	33	31	44	25	25	30	49	53	39	35	34	47	29	41	31	46	30	41
6	46	30	52	53	51	56	34	36	48	28	28	32	53	58	42	41	38	52	31	44	35	52	35	45
5	50	32	57	59	60	61	37	39	52	31	30	35	59	61	46	45	42	57	36	46	39	55	39	52
4	57	37	61	63	64	67	44	42	56	34	35	39	63	68	49	51	44	65	41	51	45	61	43	59
3	63	42	69	73	73	80	53	46	64	38	40	44	71	78	55	57	49	73	48	59	53	68	49	65
2	74	46	76	82	87	90	60	56	71	43	47	51	77	88	72	66	53	84	62	66	59	81	54	73
1	83	60	97	107	110	118	84	67	89	56	59	64	87	120	86	86	66	104	79	77	71	95	63	91
0	144	129	145	170	172	213	249	200	172	110	136	122	166	140	156	207	135	171	119	127	129	180	152	126
N	90	96	108	125	74	96	110	99	108	118	125	136	91	94	115	130	139	90	102	146	75	137	111	98

*The decile values at 0 and 10 identify the range of scores.

Table 29
Deciles for Table Completion Time, Semester 4
(To the Nearest Quarter Minute)

Decile*	Table Number																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
10	16	7	20	13	12	19	11	9	25	10	11	9	21	9	19	14	16	33	10	16	16	20	13	14
9	27	18	30	34	30	37	22	18	32	18	16	19	30	32	29	22	25	37	20	29	21	33	22	25
8	30	23	37	39	36	44	25	22	37	20	19	23	36	38	34	28	29	42	26	33	26	37	25	33
7	35	25	42	46	39	47	28	28	41	22	23	26	42	44	38	32	33	48	29	35	30	43	29	38
6	40	27	47	50	43	52	32	31	44	24	25	29	48	49	43	37	35	52	33	39	33	48	31	43
5	45	32	50	55	49	57	35	35	51	26	27	33	53	55	49	40	39	58	37	43	38	54	35	47
4	49	35	54	64	55	65	39	39	55	31	30	37	59	63	53	44	44	63	42	47	43	58	38	51
3	55	40	62	71	62	73	42	44	61	34	32	42	66	71	58	49	50	70	47	53	48	64	42	57
2	61	47	70	80	70	90	48	50	79	42	39	49	73	80	69	55	59	77	55	62	56	68	46	64
1	71	58	88	95	87	112	66	63	95	60	46	69	86	99	84	71	69	96	71	78	67	86	60	78
0	199	85	143	200	138	164	121	197	156	232	71	114	183	152	141	140	184	168	148	152	150	139	125	128
N	114	107	130	140	103	111	127	115	107	123	149	145	101	116	128	142	154	99	113	151	109	141	143	106

*The decile values at 0 and 10 identify the range of scores.

Table 30
Deciles for Table Completion Time, Semester 4+
(To the Nearest Quarter Minute)

Decile*	Table Number																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
10	13	8	18	16	15	12	14	11	12	8	10	12	17	4	16	11	9	19	11	13	10	10	7	18
9	21	12	28	27	24	30	17	14	21	14	13	16	24	25	22	17	17	26	18	20	16	24	17	22
8	24	14	30	31	28	35	19	17	23	16	14	18	27	33	26	20	19	29	20	23	18	29	20	26
7	26	15	33	35	30	40	21	19	26	18	16	20	30	37	28	21	21	32	22	26	20	33	22	29
6	27	17	36	39	32	44	23	20	28	19	17	22	33	39	30	24	23	36	24	30	22	35	25	31
5	28	18	39	42	36	47	25	23	30	21	19	24	36	42	32	26	24	39	27	32	24	38	27	35
4	31	19	42	46	37	50	28	26	33	22	21	26	38	46	36	29	25	42	29	36	25	40	30	38
3	33	20	45	51	39	55	31	29	36	24	24	30	42	51	39	32	28	46	33	39	27	42	32	42
2	36	23	49	59	44	58	35	34	40	26	27	33	47	57	44	36	31	51	39	42	29	46	37	45
1	40	28	55	70	50	72	41	41	45	35	32	40	56	67	52	42	37	64	48	48	35	53	45	55
0	53	62	84	101	87	143	75	65	111	66	66	76	92	107	99	68	70	115	64	81	74	91	88	116
N	153	154	166	172	143	144	153	153	157	156	169	170	161	166	153	150	151	151	155	160	152	157	155	155

*The decile values at 0 and 10 identify the range of scores.

Table 31
Deciles for Manuscript Completion Time, Semester 2
(To the Nearest Quarter Minute)

Decile*	Manuscript Number															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
10	17	19	16	10	17	20	10	16	12	14	17	21	12	16	8	18
9	30	39	26	17	26	30	33	25	24	21	35	28	24	36	17	30
8	36	43	38	25	31	36	41	31	30	26	42	35	28	47	22	38
7	43	45	43	28	32	41	45	35	32	32	46	40	32	54	27	41
6	48	49	54	31	35	48	49	38	37	36	48	44	36	59	30	47
5	55	55	57	33	39	52	55	42	45	39	52	50	42	65	34	53
4	60	61	67	36	44	58	59	48	51	42	61	56	47	74	39	59
3	65	65	71	42	52	63	64	56	58	47	66	67	53	79	45	70
2	73	69	78	47	56	77	72	61	68	54	75	77	58	86	51	79
1	94	78	98	55	62	84	92	80	90	70	92	93	74	97	63	96
0	186	127	136	140	136	106	122	138	132	143	148	131	158	128	109	140
N	81	54	81	91	67	51	78	149	126	131	71	129	161	117	139	129

*The decile values at 0 and 10 identify the range of scores.

Table 32
Deciles for Manuscript Completion Time, Semester 4
(To the Nearest Quarter Minute)

Decile*	Manuscript Number															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
10	17	17	24	11	10	15	19	6	10	13	24	20	8	16	9	20
9	32	30	35	19	24	27	35	24	21	23	32	30	23	33	20	27
8	40	35	44	24	29	32	42	29	25	27	41	35	28	41	23	34
7	43	40	47	27	32	37	48	32	28	30	47	40	36	47	27	39
6	50	44	51	30	38	43	51	36	32	34	50	43	40	52	31	43
5	54	49	56	34	41	47	55	40	35	39	56	49	45	55	34	48
4	60	54	66	37	47	50	61	46	38	43	59	54	49	60	40	52
3	67	61	72	41	54	59	66	50	43	47	68	62	59	67	46	59
2	77	68	79	45	63	67	78	58	52	52	74	69	69	77	53	68
1	90	81	91	52	79	75	94	71	65	60	80	81	77	86	71	82
0	157	139	131	97	159	138	132	144	136	135	121	160	141	141	131	143
N	122	94	101	106	92	98	100	166	139	165	88	152	188	142	164	159

*The decile values at 0 and 10 identify the range of scores.

Table 33
Deciles for Manuscript Completion Time, Semester 4+
(To the Nearest Quarter Minute)

Decile*	Manuscript Number															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
10	14	18	25	8	8	16	16	13	11	6	12	10	10	15	8	17
9	23	24	31	17	17	23	25	19	14	15	26	21	15	27	12	22
8	27	27	34	18	19	26	28	22	15	17	29	23	17	29	14	25
7	30	31	37	20	22	29	30	23	17	19	32	24	20	31	16	27
6	31	33	38	21	25	30	31	25	19	21	35	26	21	34	17	29
5	33	37	42	23	26	32	33	28	20	23	37	28	23	36	19	31
4	35	39	44	24	29	35	36	32	22	25	39	30	25	39	21	32
3	37	41	46	26	33	38	39	34	24	28	41	33	28	46	23	35
2	40	44	51	29	38	46	42	38	27	30	45	37	30	50	27	38
1	43	50	57	34	44	53	49	46	33	36	59	40	36	59	33	42
0	89	115	98	63	70	85	92	89	73	51	101	65	83	90	96	58
N	111	91	136	107	138	107	120	134	128	139	120	130	113	112	133	94

*The decile values at 0 and 10 identify the range of scores.

Table 34
Percentiles* for Uncorrected Typographical Errors in Letters, Semester 2

Number of Errors	Letter Number																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
0	92	97	96	96	89	97	91	71	86	91	91	83	80	97	97	69	77	84	80	83	76	92	95	81
1	80	79	93	80	75	84	74	45	53	72	76	58	56	82	88	43	54	64	63	64	55	82	86	62
2	67	68	75	66	65	79	61	33	33	48	66	38	40	71	78	26	38	47	47	48	33	74	68	41
3	51	64	65	57	58	75	49	19	22	38	53	26	29	58	64	15	23	38	35	38	23	60	57	35
4	45	53	61	45	40	62	39	13	17	30	45	15	22	49	47	10	14	33	25	29	16	45	51	28
5	34	46	53	41	31	57	30	11	9	24	41	11	14	39	41	7	8	31	19	22	14	39	47	14
6	27	39	43	31	22	49	21	7	3	19	36	8	8	31	37	5	6	26	11	18	11	31	39	12
7	24	34	33	27	14	46	15	4		11	32	6	4	14	27	4	5	22	8	13	8	26	32	7
8	18	29	31	20	12	35	8	3		6	27	2	3	19	20	2	3	20	6	13	3	19	27	6
9	13	24	26	16	9	29	6	3		4	23		2	16	18		2	14	5	10	1	16	18	
10	11	20	25	12		21	5		0	2	21	2		14	13	1	1	9	4	8		15	14	
11	8	18	15	10	8	13	4	2		2	19	1		11	9			5	3	7		12	11	3
12	6	17		8		11	2					0	1	6	7			4	1	5	0	10	10	
13	4	13	11	6	6	6	2	1			14			4	6				0			8	7	
14				6	4		1	0			13			2	4			2		3		6		1
15	3	11	10	5							12		0		3			0		1		4	6	0
16			8							1	9			0	2								4	
17		8	7	4			1								1	0						2	3	
18		5	6			3	0				5											1		
19				4	2						4												1	
20			4	3	0										0									
Over 20	2	4	3	1		2				0	4						0			0		0	0	
N	142	76	72	159	85	63	174	157	113	123	111	126	100	95	98	178	124	81	102	104	98	80	94	69

*Cell entries represent the percentage of the subjects who made more than the specified number of errors. A "0" percentile entry indicates the largest number of errors made in a specified task.

Table 35
Percentiles* for Uncorrected Typographical Errors in Letters, Semester 4

Number of Errors	Letter Number																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
0	88	95	92	92	82	95	82	70	74	91	83	73	82	83	92	57	77	85	76	71	68	91	88	75
1	67	85	82	75	64	85	68	41	46	66	64	46	51	69	80	31	49	63	53	59	40	77	69	50
2	50	68	71	57	48	73	52	26	23	46	50	31	33	50	56	14	32	42	36	39	26	58	54	20
3	40	50	55	43	38	64	40	21	16	33	35	21	22	35	48	9	21	31	19	30	19	48	38	19
4	31	41	43	30	31	58	28	10	13	20	23	14	19	31	37	7	14	23	15	24	14	36	29	10
5	21	35	31	19	26	43	19	3	6	14	20	10	10	21	29	4	10	16	8	15	11	23	22	6
6	12	28	27	16	20	36	11	3	2	6	16	3	6	18	23	2	5	15	3	11	6	17	17	4
7	12	21	20	11	14	31	9	2	0	4	14	2		10	21	1	3	9	3	9	5	13	12	3
8	6	20	18	10	9	26	4	1		4	12		2	5	16		2	7	2	7	4	10	8	2
9	4	17	16	7	7	19	2			3	8	1	0	3	15		2	5	1	5		8	4	
10	4	12	15	5	6	16	1			1	6	0			8			2			2	5		
11		10	12	4	5	10	1				4									3			3	
12	3	6	11	3											6						1	3	1	
13	2	4	10	2		9	0							1	2	0				2		2	1	
14		1	8	1	4	6		1		0	2						0	1	0	0		1		
15			6												1									
16				1							1										0			
17	1		5		3	5																		
18			4			2								0				0				0		1
19	1					0																	0	
20	0		3	0	1										0									
Over 20		0	2		0			0			0													0
N	138	82	101	167	98	81	151	155	110	114	101	111	106	78	87	182	132	86	115	111	106	92	156	139

*Cell entries represent the percentage of the subjects who made more than the specified number of errors. A "0" percentile entry indicates the largest number of errors made in a specified task.

Table 36
Percentiles* for Uncorrected Typographical Errors in Letters, Semester 4+

Number of Errors	Letter Number																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
0	52	55	69	65	14	56	54	52	37	91	57	51	53	62	64	28	50	46	42	49	41	53	55	37
1	21	26	39	27	4	34	29	20	12	29	27	24	29	32	34	7	16	14	12	14	15	28	20	19
2	8	16	24	12	2	17	13	9	5	10	14	9	13	21	19	4	5	5	5	7	8	16	8	10
3	4	8	10	4		7	6	3	3	6	9	5	7	13	10	3	3	3	3	1	2	7	7	3
4	2	5	1	3		3	4	1	0	3	7	2	4	8	4	2	2	1		0	1	3	3	
5	1	4	0	2	1	0	1	0			4	1	1	3	2	0			1			1	2	2
6					0					2	2			1	1		1				0			
7	0	3		1			0				1							0					1	
8		1									0								0				0	
9				0								0												
10		0								0			0	0	0							0		0
11																								
12																								
13																								
14																								
15																								
16																								
17																								
18																								
19																								
20																	0							
Over 20																								
N	101	73	79	104	107	88	95	119	100	121	116	113	129	131	126	127	134	143	124	132	121	140	141	112

*Cell entries represent the percentage of the subjects who made more than the specified number of errors. A "0" percentile entry indicates the largest number of errors made in a specified task.

Table 37
Percentiles* for Uncorrected Typographical Errors in Tables, Semester 2

Number of Errors	Table Number																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
0	72	60	85	86	76	83	48	56	73	40	66	48	64	72	70	88	57	73	41	81	97	76	62	55
1	58	32	56	63	50	64	22	38	57	11	38	21	41	56	59	52	38	53	19	61	48	57	27	26
2	37	18	34	45	38	44	10	21	42	9	30	10	23	35	50	29	29	38	8	47	20	47	11	18
3	21	11	24	33	24	32	5	14	30	4	22	4	18	24	37	15	21	28	6	34	13	36	6	13
4	14	5	19	27	15	24	2	8	20	2	14	1	13	21	29	8	14	22	2	25	11	30	5	3
5	11	2	13	18	12	18	0	5	15		10	0	11	15	22	3	10	14		18	3	22	1	
6	9		8	17	7	14		3	13	1	8		8	13	15	2	6	9		13	1	20		1
7	6	0	6	12	5	9		2	10		7		7	10	11	2	4	8	0	11	0	17		
8	4		4	9	4	8		0	6		5		4	9	10	1	3			8		12	0	0
9	2			7					6	0	3		3	6	7		1	3		6		9		
10				6	3	7			4		2			5	3			2		5		6		
11	1		3	4		5			2				1	3						5		5		
12	0		2	3		3			1		2				2	0				4		2		
13				2	1	2							0				1	1		3				
14					0				0															
15						0					1			1						2		1		
16			1								0			0						1				
17				2											1			0						
18																								
19				1																0		1		
20				0											0		0							
Over 20			0																			0		
N	90	96	108	125	74	96	110	99	108	118	125	136	91	94	115	130	139	90	102	146	75	137	111	98

*Cell entries represent the percentage of the subjects who made more than the specified number of errors. A "0" percentile entry indicates the largest number of errors made in a specified task.

Table 38
Percentiles* for Uncorrected Typographical Errors in Tables, Semester 4

Number of Errors	Table Number																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
0	58	43	74	73	66	68	35	51	64	35	54	27	59	49	68	81	52	68	35	72	90	67	38	26
1	33	28	41	49	31	45	15	24	44	17	33	10	38	34	43	42	35	47	8	52	39	42	14	13
2	12	14	20	26	19	30	8	9	23	7	24	6	23	23	26	25	23	30	4	40	16	30	9	8
3	9	8	13	14	11	20	3	5	14	5	15	3	17	15	18	10	15	18	0	30	8	18	6	4
4	5	5	10	11	8	15	2	3	12	2	9	1	10	11	15	6	8	11		19	6	16	3	2
5	4		8	10	6	13	1		7	1	7	1	8	9	10	4	6	10		16	4	11	1	1
6	3		4	7	5	11	0	2	5		5	0	6	5	7		5	6		13	3	9	0	0
7		2	3	5	4	7			4		3		5		6	2	4	4		9	2			
8			2	4	3	6		1	2		2			3		1	3	2		7		8		
9	2	1	1	2	1	5			0				4		5	1	2			5		6		
10		0	0			5					1		2				1	0		4		6		
11	1			1		4														3		5		
12															5					2		4		
13	0				0					0			1	2	3					1		4		
14						3								1			1					3		
15																				0				
16															2							2		
17														0			0							
18																								
19				1		2																1		
20				0		1					1				2									
Over 20						0		0			0		0		1	0					1	1		
N	114	107	130	140	103	111	127	115	107	123	149	145	101	116	128	142	154	99	113	151	109	141	143	106

*Cell entries represent the percentage of the subjects who made more than the specified number of errors. A "0" percentile entry indicates the largest number of errors made in a specified task.

Table 39
Percentiles* for Uncorrected Typographical Errors in Tables, Semester 4+

Number of Errors	Table Number																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
0	42	33	54	56	42	44	16	27	35	13	17	11	31	29	46	66	29	40	21	52	78	45	17	13
1	17	6	28	35	12	14	3	5	16	3	4	3	11	15	22	22	9	13	4	29	11	20	4	2
2	6	2	7	11	5	6	1	4	7	2	3	0	2	8	16	7	5	9	2	14	3	13	1	
3	2	2	3	4	2	2		0	2	1	2		0	4	7	2	2	5	0	9	2	8		1
4		1	1	3		1	0		1		1			1	4	0		1		7		7		0
5	1			1	2	0			0		1				2		0	0		2		3		
6	0	0	0	0							0			0						1		2		
7					1										0					1	1	1		
8																				0				
9										0														
10																						1		
11																								
12																								
13																								
14																								
15																								
16																								
17																								
18																								
19																								
20					0																0	0	0	
Over 20																								
N	153	154	166	172	143	144	153	153	157	156	169	170	161	166	153	150	151	151	155	160	152	157	155	155

*Cell entries represent the percentage of the subjects who made more than the specified number of errors. A "0" percentile entry indicates the largest number of errors made in a specified task.

Table 40
Percentiles* for Uncorrected Typographical Errors in Manuscripts, Semester 2

Number of Errors	Manuscript Number															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0	90	85	90	89	94	96	94	89	75	89	94	87	61	87	64	96
1	81	80	78	73	67	86		75	59	65	83	78	39	69	44	88
2	69	76	69	46	57	71	81	59	37	48	72	63	25	60	26	73
3	63	54	58	33	42	57	71	46	21	32	68	50	22	45	19	60
4	53	43	49	23	33	35	69	34	16	19	58	40	16	35	12	50
5	47	37	44	19	19	27	56	23	8	11	49	33	12	29	9	40
6	35	24	36	13	16		44	15	4	6	34	26	8	25	7	29
7	26	19	30	9	9	20	33	11	1	2	30	22	6	20	6	22
8	22	15	26	4	6	14	29	7			28	19	3	13	4	17
9	17		22	3	4	10	23	6		2	21	16	2	12		14
10	16	13	15		3	8	22	4			20	14	2	10	1	12
11	14	11	10	2	2	6	21	2	0		14	11	0	9		10
12	10	9	9	1	0	2	14	1				8		7		8
13	6			0			12				13	5		6		6
14	2							1			8	5		3		5
15		7					6				7	3				4
16		4				0	4				6	1				
17			4				3	0			3			3		3
18			2							1				1		
19			1													
20	0														0	2
Over 20		2	0				1			0	1	0		0		2
N	81	54	81	91	67	51	78	149	126	131	71	129	161	117	140	129

*Cell entries represent the percentage of the subjects who made more than the specified number of errors. A "0" percentile entry indicates the largest number of errors made in a specified task.

Table 41
Percentiles* for Uncorrected Typographical Errors in Manuscripts, Semester 4

Number of Errors	Manuscript Number															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0	95	90	85	81	88	95	94	83	79	88	88	79	51	82	68	87
1	83	79	73	59	61	80	79	61	55	57	80	62	27	60	36	70
2	72	62	64	45	46	63	62	41	27	34	67	45	19	42	20	53
3	54	50	50	34	25	53	53	30	17	20	49	34	10	25	10	42
4	37	43	36	20	20	32	40	17	8	12	40	28	5	13	5	29
5	30	31	32	14	16	23	24	10	4	7	30	20	2	12	4	23
6	23	21	28	8	11	17	18	7	1	4	24	16	2	8	3	19
7	17	17	23	6	8	12	15	5		2	17	13		6	1	11
8	13	15	17	2	7	10	7	4		1	14	9	1	4		9
9	10	14	16	1	5	7	5	3			11	8	1	3		8
10	7	9	13		3	6	4	2	1		9	7	0	2	1	8
11	5		6		2	4	3				7	6		1	0	6
12	2	7	4	0			2	2		0		3		1		6
13	2				1			1			6					4
14	1	6	1			3		0	0		5			0		3
15		3	0													2
16							1					3				1
17	0	2				0					2	2				
18							0				1					
19												1				1
20		0									0	1				
Over 20					0							0				0
N	122	94	101	106	92	98	100	166	139	165	88	152	188	142	164	159

*Cell entries represent the percentage of the subjects who made more than the specified number of errors. A "0" percentile entry indicates the largest number of errors made in a specified task.

Table 42
Percentiles* for Uncorrected Typographical Errors in Manuscripts, Semester 4+

Number of Errors	Manuscript Number															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0	63	47	45	52	47	63	49	53	55	67	75	47	17	35	33	60
1	38	27	24	19	21	36	30	12	15	19	30	22	1	16	8	32
2	20	20	17	7	5	17	14	3	2	7	11	10	0	11	2	17
3	13	9	7	3	2	11	6	0	0	2	7	7		4	0	8
4	4	7	4	1	1	0	3			1	5	4		2		5
5	2	5	3				1				2	2		0		4
6	1	3		0	0		0				0	0				1
7		1	2													0
8			1													
9	0	0	0													
10																
11																
12																
13																
14																
15																
16																
17																
18																
19																
20																
Over 20										0						
N	111	91	136	107	138	107	120	134	128	139	120	130	113	112	133	94

*Cell entries represent the percentage of the subjects who made more than the specified number of errors. A "0" percentile entry indicates the largest number of errors made in a specified task.

Table 43

Percentiles* for Form Errors in Letters, Semester 2

Number of Errors	Letter Number 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
0	100	100	100	97	95		98	97			99					96	98			99			99	
1	91	97	99	86	89		90	87	97	96	96		98	99	97	84	95	95			96		91	97
2	73	96	94	67	80		72	74	82	92	78	99	97		85	62	91	78			93	99	80	90
3	59	93	92	43	71		49	55	66	72	66	94	94	95	70	39	78	58	98	98	87	92	61	71
4	40	87	85	29	60	98	30	36	47	54	57	89	90	87	54	25	65	48	95	90	69	89	38	55
5	27	83		17	47	94	20	22	27	39	42	76	83	78	42	17	43	28	85	85	50	86	23	45
6	14	79	83	9	28	92	13	8	13	26	24	62	64	72	29	8	28	19	75	70	37	68	12	32
7	8	64	72	7	14	81	7	3	9	15	17	42	57	63	15	3	18	12	63	56	27	55	6	22
8	4	51	58	4	9	73	5	2	8	11	13	30	46	55	9	2	11	7	51	47	16	36	4	10
9	2	43	44	3	4	68	3		5	7	7	21	32	45	5	1	7	5	45	41	9	26	3	7
10	1	39	39	1	1	60	2	1	3	3	5	11	25	34	1	0	4		37	30	7	16	1	4
11	1	33	35	0		52	1		2	2	2	6	12	28			3	2	30	22	3	9		1
12	0	22	26		0	41	1		0		1	4	7	18	0		1	1	21	14	2	2		0
13		13	19			32				0	0	2	4	14				0	16	11	0		0	
14		7	15			27	0	0				0	3	9			0		11	6				
15		4	8			21							1	6					7	2		1		
16		1	4			11							0	3					4	1		0		
17			1			8								1					3	0				
18		0	0			3								0					2					
19						2																		
20																								
Over 20						0													1					
N	142	76	72	159	85	63	174	157	113	123	113	126	100	95	98	178	124	81	102	104	98	80	94	69

*Cell entries represent the percentage of the subjects who made more than the specified number of errors. A "0" percentile entry indicates the largest number of errors made in a specified task.

Table 44
Percentiles* for Form Errors in Letters, Semester 4

Number of Errors	Letter Number 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
0	96		98	96	95	99	94	94	97	98	96				99	96	98	97				99	94	99
1	85	99		78	81	96	85	84	90	89	88	99		96	94	80	87	83	98	98	99	98	83	91
2	60	94	95	53	70	91	73	74	72	80	70	96	95	87	83	49	75	69	96	96	96	96	62	78
3	40	87	87	31	44	89	42	54	56	66	55	86	89	77	61	31	64	49	92	91	93	84	44	63
4	24	76	79	20	31	84	25	26	44	43	43	79	79	68	38	16	47	23	88	75	82	79	26	41
5	14	59	63	13	23	79	15	10	27	23	21	66	67	56	25	8	35	17	70	64	69	72	16	25
6	7	50	51	4	19	68	5	6	18	12	12	49	59	49	12	3	24	13	53	55	53	55	10	14
7	3	40	40	2	11	62	3	5	15	7	8	30	46	38	3	1	13	5	37	45	40	39	8	8
8	1	30	34	1	8	51	2	1	7	4	7	14	35	31	2	0	7	1	29	32	29	29	3	4
9	0	20	24		6	40	1	0	5	3	4	9	26	26	0		4		16	25	16	15	1	1
10		16	17	0	2	32	0		2	0	1	5	20	17			1		12	14	7	9	0	0
11		9	11			27					0	2	14	5			0		9	11	3	1		
12		5	8		1	15			1			1	10	1					8	6	0	0		
13			4			11			0			0	5	0					5	4				
14		4	3			7							3					0	4	2				
15		2	2			6							2						3					
16		1	0			5													0	0				
17		0				2																		
18						1																		
19													1											
20					0																			
Over 20						0							0											
N	138	82	101	167	98	81	151	155	110	114	101	111	106	78	87	182	132	86	115	111	106	92	156	139

*Cell entries represent the percentage of the subjects who made more than the specified number of errors. A "0" percentile entry indicates the largest number of errors made in a specified task.

Table 45

Percentiles* for Form Errors in Letters, Semester 4+

Number of Errors	Letter Number																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
0	64	93	96	64	70	92	93	92	91	90	75	96	98	91	77	88	83	73	98	94	98	98	67	84
1	28	77	68	26	46	75	55	54	63	60	38	79	87	71	41	37	53	39	90	74	87	79	27	56
2	11	51	41	8	36	59	26	18	35	37	13	60	71	46	19	12	21	13	69	48	53	53	9	27
3	3	32	28	2	32	45	5	7	14	16	5	38	59	32	5	3	8	4	45	34	26	29	1	9
4	1	16	15	0	30	34	0	1	7	10	3	26	44	16	0	1	3	2	34	23	13	14	0	3
5	0	10	8			23		0	2	5	2	13	31	9		0	2	1	16	14	4	5		2
6		7	4			11			1	2		6	19	8			0	0	6	9	3	2		
7		4	1			8						3	10	4					3	4	0	1		
8		1	0			5						2	7	2					2	3		0		1
9						2							4	1					1	2				0
10		0			22						1		3							0				
11					16																			
12					12	0							2						0					
13					11																			
14																								
15																								
16																								
17																								
18																								
19																								
20					8																			
Over 20					7				0	1	0	1	1	0										
N	101	73	79	104	107	88	95	119	100	121	116	113	129	131	126	127	134	143	124	132	121	140	141	112

*Cell entries represent the percentage of the subjects who made more than the specified number of errors. A "0" percentile entry indicates the largest number of errors made in a specified task.

Table 46
Percentiles* for Form Errors in Tables, Semester 2

Number of Errors	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
0		95		99	99		98	99			78	99			90	98	96		99	94		99	99	
1	93	82	99	98	93		92	95	99	96	62	93		99	77	96	66	98	98	74	96	99	90	
2	89	67	95	96	89	96	79	93	96	92	39	82	98	96	59	89	34		96	47	93	94	83	
3	74	45	93	91	84	95	67	85	94	77	14	63	93	93	48	84	21	94	88	23	89	89	74	
4	58	30	81	83	74	93	49	72	83	53	5	48	88	86	37	75	8	91	82	11	75	84	61	96
5	44	14	69	77	58	85	35	54	73	34	1	33	78	82	25	62	2	87	60	3	64	76	51	95
6	26	7	43	65	45	79	17	29	61	18	0	18	64	76	17	48	0	80	46	2	47	67	46	85
7	17	2	29	55	32	75	8	19	53	6		7	52	68	9	35		74	34	1	35	53	34	81
8	10	1	17	50	23	69	3	7	31	2		4	41	57	3	22		63	21		24	40	26	74
9	4	0	10	41	18	62	0	3	18	0		1	35	48	1	14		53	9		16	29	17	67
10	1		7	26	11	51		2	6			1	19	38		5		42	6		7	20	9	58
11	0		4	15	7	45		1	5			0	14	27		2		30	3		1	15	5	42
12			3	7	3	40		0	3				5	20		1		18	1		0	8	2	31
13			2	2		30			2				3	11	0	0		12	0			7		21
14			0	2	0	28			1					6				7				4	1	14
15				0		21			0				2	4				4		0		3	0	8
16						18							1	2				3				2		2
17						14							0	1				1				0		1
18						11																		0
19						9																		
20						8								0				0						
Over 20						3																		
N	90	96	108	125	74	96	110	99	108	118	125	136	91	94	115	130	139	90	102	146	75	137	111	98

*Cell entries represent the percentage of the subjects who made more than the specified number of errors. A "0" percentile entry indicates the largest number of errors made in a specified task.

Table 47
Percentiles* for Form Errors in Tables, Semester 4

Number of Errors	Table Number 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
0	99	93	98		98		99	98	99	99	78	94	95		88	98	99			96	99		99	99
1	92	84	96	99	92	97	83	90	93	94	58	81	93	99	67	92	70		98	75	94	96	88	
2	79	67	95	93	84	93	69	83	91	79	42	70	88	96	51	78	48	99	92	54	93	88	76	98
3	72	46	83	88	68	88	56	76	82	63	19	51	83	86	36	68	18	94	76	23	79	73	62	93
4	63	21	64	74	56	82	43	63	74	49	5	39	72	80	25	62	5	89	64	7	65	59	45	87
5	50	8	49	61	46	75	28	50	65	33	2	27	66	72	13	53	2	76	50	1	54	51	41	79
6	37	5	32	49	35	68	19	30	48	20	1	18	59	61	7	44	1	65	36	0	43	44	32	68
7	21	2	18	39	23	59	4	14	37	4		8	51	48	2	35		56	26		29	37	23	62
8	12	0	8	31	14	54	2	6	26	0	1	3	40	41	1	22		46	8		23	25	18	53
9	1		2	22	11	48		1	15			0	26	33		13	0	39	4		17	18	14	45
10	0		2	12	6	42	1	0	7				17	22		6		21	1		14	14	8	38
11			0	8	4	36	0		5				11	11		3		15	0		9	11	3	29
12				5	1	29			3				8	8		2		9			4	9	2	20
13				1	0	23			1					6		1		5			0	8		8
14				1		17							5	3				2				5	1	3
15				0		14			0				1	2				1				3		0
16						8																1		
17						6								1				0						
18						4								0										
19						3																	0	
20						1																		
Over 20						0					0		0		0	1						0		
N	114	107	130	140	103	111	127	115	107	123	149	145	101	116	128	142	154	99	113	151	109	141	143	106

*Cell entries represent the percentage of the subjects who made more than the specified number of errors. A "0" percentile entry indicates the largest number of errors made in a specified task.

Table 48
Percentiles* for Form Errors in Tables, Semester 4+

Number of Errors	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
0	96	84	99	99	92	98	94	98	95		62	86	95	99	81	93	89	98	98	87	97		95	
1	77	58	83	97	71	96	67	80	83	91	37	61	88	96	49	78	47	95	88	51	87	90	70	95
2	52	33	64	82	55	90	44	63	67	53	18	40	77	81	26	56	16	84	73	26	71	67	52	91
3	35	17	47	68	36	79	19	52	51	35	2	23	59	72	11	39	4	72	52	6	47	47	29	82
4	19	6	23	51	24	71	8	37	41	17	1	7	45	52	4	24	1	58	30	1	30	25	16	63
5	9	3	10	35	13	62	4	24	22	4	0	3	32	37	2	17	0	43	15	0	13	19	12	48
6	2	0	3	25	8	45	2	12	12	2		1	22	24	2	10		28	9		4	13	6	33
7	1		1	15	5	33	1	8	5	1		0	15	18	1	5		17	2		1	9	3	23
8	0		0	10	2	26	1	3	2	0			8	12	0	2		10	1		0	4	2	11
9				3	1	21		1					5	6		2		5				2	1	6
10				2		18		0	1				4	4		1		2	0			1	0	3
11				0		13			0				2	2		[illegible]		1				0		2
12					0	9							2					0						2
13						5							1	2										0
14						4								1										
15																								
16						2								0										
17													0											
18						1																		
19																								
20																								
Over 20						0	0																	
N	153	154	166	172	143	144	153	153	157	156	169	170	161	166	153	150	151	151	155	160	152	157	155	155

*Cell entries represent the percentage of the subjects who made more than the specified number of errors. A "0" percentile entry indicates the largest number of errors made in a specified task.

Table 49
Percentiles* for Form Errors in Manuscripts, Semester 2

Number of Errors	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	Manuscript Number															
0						98				98	99	99	96	97	94	
1					99	96		97		89		98	90	84	82	
2				99	97		99	89		75		92	76	71	59	
3		96	99	96	94	88	94	74	99	64	94	90	64	52	37	
4	96	94		93	87	76	90	62	94	45	90	82	53	38	17	99
5	95	89	93	91	82	73	86	42	89	26	87	77	42	32	11	95
6	88	85	86	82	73	67	78	29	80	13	85	68	35	25	2	87
7	78	72	81	68	66	51	74	20	71	6	73	57	30	20	1	78
8	67	61	74	58	55	37	67	12	60	2	62	49	22	15	0	64
9	57	57	69	48	42	22	55	7	54	2	51	38	16	11		47
10	41	46	64	38	33	6	47	4	44	0	44	22	10	8		33
11	26	30	58	22	24	2	41	3	31		32	10	7	5		20
12	15	24	47	14	19		33	1	17		24	4	3	2		11
13	10	13	41	9	15	0	26	0	10		20	0	2	1		5
14	5	11	33	4	9		13		4		18		2			1
15	4	7	26	2	6		9		2		13					0
16	2	6	17	1	2		8		0		6		1			
17	0		11		0						4		0	0		
18		4	5	0			5									
19		0	4				4				3					
20			2				3				0					
Over 20			1				1									
N	81	54	81	91	67	51	73	149	126	131	71	129	161	117	140	129

*Cell entries represent the percentage of the subjects who made more than the specified number of errors. A "0" percentile entry indicates the largest number of errors made in a specified task.

Table 50

Percentiles* for Form Errors in Manuscripts, Semester 4

Number of Errors	Manuscript Number															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0		99				97		99		98		99	96	92	98	
1	98		98	99	99	95	99	95	99	88	99	97	82	75	84	99
2		95	97	96	97	93	97	87	98	70	95	94	65	58	57	98
3	96		96	92	92		90	73	91	48	93	86	52	44	30	96
4	90	93	93	87	89	84	85	42	88	28	89	78	42	32	13	92
5	86	85	86	76	84	76	79	25	80	18	82	68	34	22	5	86
6	81	74	81	69	78	59	73	16	72	11	70	58	27	15	4	77
7	72	66	69	57	66	50	65	5	57	5	60	48	21	10	2	65
8	61	55	61	42	49	41	59	4	45	2	51	40	15	6	1	54
9	48	49	59	31	36	32	45	1	32	0	50	30	9	6		45
10	37	36	52	25	27	17	31	0	27		43	17	6	4	0	33
11	28	27	46	21	13	11	23		17		31	10	4	3		21
12	20	23	37	14	8	7	18		11		20	5	2			11
13	13	15	32	6	5	3	13		4		11	1		1		6
14	9	10	26	1	4	0	9		3		7		1			2
15	5	9	19		3		7		2		5					1
16	2	6	12				5		1		2		1			
17	1	4	6	0	0							1				1
18	0	3	4				3		0		1		0			0
19		1	2				1									
20		0									0					
Over 20			0				0					0		0		
N	122	94	101	106	92	98	100	166	139	165	88	152	188	142	164	159

*Cell entries represent the percentage of the subjects who made more than the specified number of errors. A "0" percentile entry indicates the largest number of errors made in a specified task.

Table 51

Percentiles* for Form Errors in Manuscripts, Semester 4+

Number of Errors	Manuscript Number															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0	96	96	96	97	94		96	93	92	71	98	93	85	73	85	95
1	79	83	90	88	81	90	85	73	69	46	81	74	59	41	50	81
2	55	57	67	64	58	71	62	48	49	29	55	47	29	15	21	61
3	28	39	43	39	38	42	43	21	31	17	33	33	10	11	8	32
4	14	25	30	22	22	24	25	5	10	4	20	14	5	7	1	20
5	6	16	26	11	16	15	14	3	6	1	9	9	0	6	0	9
6	3	13	18	4	9	6	6		5	0	5	4		2		3
7	1	9	12	3	6	2	4	1	1		3	2		1		1
8	0	8	5	0	4	1	3				1					0
9		4	4		2		1	0	0			1				
10		3	3		1						0	0				
11		1			0		0							0		
12			2			0										
13			1													
14			0													
15																
16																
17																
18																
19																
20																
Over 20		0														
N	111	91	136	107	138	107	120	134	128	139	120	130	113	112	133	94

*Cell entries represent the percentage of the subjects who made more than the specified number of errors. A "0" percentile entry indicates the largest number of errors made in a specified task.

Straight Copy Timed Writing

Although he has been dead more than a quarter of a century and did 67
most of his major work more than fifty years ago, even now the world's 138
best known inventor is without doubt Thomas Alva Edison. It is to him 209
that we attribute the microphone, the phonograph, the electric light 278
and lighting systems, the motion picture camera, and many other 342
inventions of great benefit to mankind that we take for granted today. 413
Edison had very little formal education, but he early demonstrated a 482
genius for tinkering and a passion for experiment. He had, as well, 551
tremendous patience, the compulsion to work for hours on end without 620
sleep until a problem was solved, a unique talent for leading and 686
inspiring other men, a strong interest in practical benefits for 751
mankind, and the good judgment to employ as helpers trained scientists, 823
without whose special knowledge many of his inventions would never have 895
seen the light of day. 918

As an outstanding figure in the whole history of science and 980
invention up to now, Edison stands halfway between the craftsmen of 1047
the early nineteenth century and the theoretical scientist of our time. 1119
Our scientific knowledge has increased so greatly in recent years that 1190
no one without special training could expect to make major contributions 1263
of the sort Edison could attain in his time. It was, by the way, Edison 1329
who originated the statement, "Genius is ninety-nine per cent 1398
perspiration and one per cent inspiration." 1442

①

Mr. Harold K. Hutchins
Olympia Press
104 Minnesota Avenue
Seattle, Washington 98133

Dear Mr. Hutchins:

The enclosed brochure illustrates and describes our full line of printing equipment and supplies.

Note, especially, the high-speed press shown on page 5 of the brochure. It incorporates a number of improvements over your present model, and permits a better quality of work, as well as a higher rate of production.

We can offer you a good trade-in on your old press, bought from us ten years ago. If you are interested in having us quote prices or in discussing a trade-in with us, we would be pleased to assist you in any way we can.

Sincerely yours,

Donald Atkinson
Sales Manager

Enclosure: Brochure

Mr. George Parks Harris
819 Frontenac Lane
Newark, New Jersey 07103

②

Dear Mr. Harris:

We have received your letter in which you ask about flights from New Orleans to Atlanta, leaving New Orleans after 6:00 p.m. We are happy to send the following:

Flight No.	Leaves New Orleans	Arrives Atlanta
6	7:45 p.m.	10:16 p.m.
4	9:23 p.m.	12:28 a.m.

There are eight regularly scheduled flights each day. A timetable showing all flights is enclosed for your additional information.

If you would like to make reservations with The Amos W. Paul Travel Agency, we shall be glad to make them for you.

Yours very truly,

Robert Torrence
Reservations Department

Enclosure: Airplane Timetable

③

Mr. Jay T. Sneed
935 Portside Road
Los Angeles, California 90026

Dear Mr. Sneed:

This year's senior class at Linton High School will perform the play, "Sound of Music," each night at 9 o'clock during the week of May 12.

By attending the play, you will:

1. Be aiding the finances of the senior class.
2. Have a good time.
3. Meet with other graduates and teachers.

Prices for the evening are:

Orchestra	Center Section	$2.50	______
Orchestra	Other Sections	2.00	______
Balcony	Center Section	1.75	______
Balcony	Other Sections	1.50	______

If you wish tickets, fill in and return this form to us, with your check, in the enclosed envelope.

Yours truly,
H. Hunt
Class Secretary

Enclosure: Return Envelope

④

Send this letter to:
Mr. Paul Beckwith, Manager
Fishbach Company
1608 East Madison Street
Milwaukee, Wisconsin 53201

Dear

April 2 →
Thank you for your letter of

1283 →
Your contract No. is being given every consideration; however, no definite decision will be reached much before August 2. Fourteen bids were submitted for this job; therefore, you will understand why it will take us so long to reach a final decision.

The bids for this project are handled by Mr. Cartwright, who will notify you as soon as a final decision has been made.

We hope the information contained in this reply will assist you. If we may be of further help, please let us know at once.

Yours very truly,

J. T. Davidson
Purchasing Agent

Mr. C. L. Harris
1039 West Eighth Avenue
Los Angeles, California 90017

⑤

Dear Mr. Harris:

You are correct in noting the trend toward the increasing use of forms. There are many good reasons for this trend:

1. Our government requires many reports, all of which must be prepared on exact forms.
2. Forms are so designed that the typist is unlikely to leave out any important details; thus, accuracy is helped.
3. Forms eliminate problems of placement and arrangement.
4. The need for adjusting the typewriter is reduced.
5. Forms cut down the amount of typing required to say what is to be said.

For these reasons, more and more people are using forms today.

Yours very truly,

S. R. Quinn
Systems Division

⑥

Mr. G. N. McLean
33 West 42 Street
New York, New York 10036

Dear Mr. McLean:

We have four classes that you might wish to incorporate into your project. They are described below to permit you to determine which of them you would want to include in your investigation.

Class	Period	Students	Teacher
Typewriting I	1	18	Mrs. Johnson
Typewriting II	3	24	Mr. Marshall
Typewriting II	4	19	Miss Garland
Clerical Typewriting	6	27	Mr. Marshall

Each of the teachers involved has expressed his willingness to cooperate and is enthusiastic about the potential, valuable results. We look forward to having you with us during the week of June 17.

Yours truly,

A.C. Peters
Department Chairman

⑦

Mr. C. Wright
25 S. Main Blvd.
Los Angeles, California 90022

Dear Mr. Wright:

It is a pleasure to have you as a shareholder in our growing company.

We are enclosing financial reports and our quarterly magazine as sources of data on Fluor, Limited.

Sincerely yours,

J. R. Fluor

Enclosures: 3
1967 Annual Report
1968 Interim Report
"Fluor-O-Scope"

⑧

Mr. John Smith
17 Park Avenue
Worcester, Mass. 01605

Dear Mr. Smith:

In checking our guest lists, I noticed that you have not been with us since August, 1963.

I hope you enjoyed your visit, and that there were no shortcomings on our part. If, however, Pinehurst failed to accommodate you somehow, your comments will be helpful.

Sincerely,

Ed Hart

⑨

Mr. Edward S. Norman
39 Fourth Street
Louisville, Kentucky 40201

Dear Mr. Norman:

Please let us know your charge for 5,000 copies of each of the two displays enclosed.

1. The table should be printed in dark green on light green stock.
2. The listing should be in dark brown on buff.

Yours truly,

Don K. Lynch

Enclosures: 2
Table
Listing

⑩

Mrs. W. C. Johnson
Paxton
Nebraska 69155

Dear Mrs. Johnson:

We are able to quote prices on Wool Hooked Rugs in the size you requested:

Fawn Beige	$120
Mist Green	135
Rose	164

The enclosed samples show available colors. We shall be glad to send on approval any rug you select.

Very truly yours,

S. G. Caxton

Enc. — Material Samples

⑪

Mr. Clark T. Creighton
Southern Speakers Bureau
1250 College Park Place
Knoxville, Tennessee 37912

Dear Mr. Creighton:

We are pleased to report that we can make final plans with four Kiwanis groups for the West Coast tour of your client, Dr. Charles Mahr:

May 16	San Diego
May 17	Los Angeles
May 18	(Travel)
May 19	San Francisco
May 20	(Travel)
May 21	Portland

As we stated in our prior letter, the Kiwanis groups pay all of Doctor Mahr's expenses and his speaker's fee of $150 for each talk.

Please notify us at once if this schedule meets with your and Doctor Mahr's approval in order that we may complete the contract with the four Kiwanis clubs.

Yours truly,
Samuel E. Clarke
College Division

⑫

Mr. O. D. Link
Guidance Monographs
University of Florida
Gainesville, Florida 32601

Dear Mr. Link:

The schedule for completion of my article, contracted for in April, is:

Date	Pages
May 5	14 through 35
May 25	36 through 60
June 7	61 through 89

Yours very truly,

Charles S. Harrington

Enclosures: 3
Carbons of pages 1-13

⑬

Weston Woods Film Distributors
10 Burry Lane
Middlesex, New Jersey 08846

Gentlemen:

Please send the following films on a rental basis for the dates requested, and bill the school's account:

Title	Date	Price
Caps for Sale	May 15	$5
Never Tease a Fox	May 18	6
Millions of Cats	May 21	5

Yours very truly,

L. Harvey
Librarian

⑭

Mr. J. Stewart Young
National Federation of Sales Executives
1820 Trayne Building
Little Rock, Arkansas 72203

Dear Mr. Young:

When I let our Georgia NFSE chapters know that you might be willing to speak at one of their dinners if they could arrange their meetings to fit your trip schedule, their response was wonderful. The following schedule has been set up for you:

Date	City	Chairman
May 30	Atlanta	A. Riley
May 31	Athens	M. Miller
June 1	Macon	T. Kane
June 2	Columbus	W. Judd
June 3	Augusta	R. Crane

If you approve this heavy schedule, Mr. Young, we will move at once to make proper arrangements for your transportation and hotels.

Cordially yours,
H. N. Lambert
State NFSE Chairman

⑮

Frankland & Houghton, Inc.
113 Rider Building
Trenton, New Jersey 08607

Gentlemen:

Thank you for your request of April 5 concerning our rates for space in *Junior Executive* magazine.

We are enclosing our standard rate schedule. You will notice that the rates for the space about which you specifically inquired are as follows:

Quarter page	$ 153
One-half page	268
Complete page	479

Worth noting also is the 10% discount you receive for four or more reservations in a calendar year.

If you wish to reserve space in our July issue, which is going to press next, we should have your reservation and copy not later than May 30.

Yours very truly,
Jeremiah Prescott
Business Manager

Enclosure: Rate Card

⑯

Send to: Jackson & Merritt
1642 West End Street
Portland, Oregon 97208

Gentlemen:

$100.75

This is the second letter we have written you regarding your delinquent account, which amounts to $ and was due on the

13th of March

Please give this account your immediate attention so that we can close your balance on our records.

Very truly yours,

R. D. West

⑰

Mrs. Jane Smith
16 Main Street
Westfield, Mass. 01085

Dear Mrs. Smith:

Stanley Home Products welcomes you!

Each dealer has at least four assets:

1. They sell a quality line of goods.
2. People have money to buy.
3. Customers like the method of merchandising.
4. Dealers like the method of selling.

Best wishes for success.

Sincerely,

C. Jay

⑱

Mr. Winston F. Potter
Potter + Viceroy, Inc.
3910 Madison Avenue
New York, New York 10028

Dear Winston:

We are pleased to approve your campaign layout for the next radio series, but with the following two changes:

1. We wish to strengthen the commercial at the close of the eleventh broadcast. We are enclosing a proposed revision.

2. We wish to drop the two Pennsylvania stations from the schedule, for we have no dealers in that state. The revised listing of stations is also enclosed.

Please let me know when you have received this note. I shall be anxious to hear what you have to say about the revised script!

Sincerely yours,
Patrick N. Trent

Enclosures: 2
Commercial Revision
Station List Revision

(19)

Miss J. T. Brown
50 North Broad Street
Atlanta, Georgia 30303

Dear Miss Brown:

Our in-service training program for new typists is as follows:

Activity	Hours	Percent
Letters	50	33
Skill Building	25	17
Tables	25	17
Reports	25	17
Forms	25	16

Yours truly,

B. Trotter

Enclosures: 2
  2 Training Bulletins
  Display Sample

⑳

Atlanta Business Show, Inc.
Peachtree Road
Atlanta, Georgia 30304

Gentlemen:

Please reserve display space for us as follows:

Space No.	No. of Tables	In Charge
25	4	Smith
47	6	Jones

We are, however, rather unhappy over certain aspect;

1. Your space fees are much higher than for shows that draw much larger crowds.
2. Your conference activities are to be held away from the booth area, thus drawing away potential viewers.
3. There are many extra fees for labor and tools which are a part of the flat exhibit fee in other shows.

If these features were remedied, we would be glad to consider reserving at least two additional spaces for exhibits.

Very truly yours,

D. T. Wilson

㉑

Mr. John F. Pearson
Judd-Kane, Inc.
32 West Desert Road
Tucson, Arizona 85702

Dear Mr. Pearson:

Please send us, express prepaid, the following items as advertised in your May sales catalogue:

2	Steel file cabinets	FF19
1	Steel desk	ED12
1	Steel desk chair	EC18
3	Steel guest chairs	GC37

Please bill us as usual.

Yours truly,

F.G. Harris

(22)

Mr. John J. Kito
General Manager
Saxon, Inc.
117 Tenth Avenue
Washington, D.C. 20002

Dear Mr. Kito:

Each fall term, Rusk Senior High School tries to place seniors in work positions, during which time they are released from classes that conflict.

Thisplan:

1. Gives business students an actual on-the-job point of view.
2. Enables students to plan a future career.
3. Allows employers to judge the work habits of potential employees.

Please indicate on the list below the number of workers you are ablto place in each area and return this form to me.

Bookkeeping ________
Filing-receptionist ________
Clerk-typist ________
Secretarial ________

Yours very truly,
H. Harry King

Mr. John Frederick Jackson
502 Livingstone Blvd., S.W.
Worcester, Massachusetts 01605

㉓

Dear Mr. Jackson:

We note, with regret, that you have decided to terminate your savings account with our bank. We hope that no lack of alertness or courtesy on our part has prompted your decision to withdraw. If so, we would appreciate some statement of the circumstances.

We have attempted to render a courteous and thorough service constantly and we want you to realize that your account with us has been very much appreciated. Naturally, we do not want to lose a customer and we hope you will find it convenient to reinstate your account in the near future.

Very sincerely yours,

Jeffrey T. Washington
Vice-President

(24)

Send to: Mr. Gerald Jordan
Acme Drill Company
83 Azure Road
Andover, Maine 04216

Dear :

ten → We were glad to extend credit to you for days.

However, as you can see from the duplicate bill enclosed, weeks have passed without payment. ← five

Please send your check by return mail.

Yours truly,

C. Calvo
Sales Manager

Enclosure: Duplicate Bill

American Dairy Association New Members

Company	Address of New York Office
Amity Dairies Inc.	32 Houston Street
Borden's Milk Products	6 Main Street
Cooperdale Dairy Co.	8 Cooper Avenue
Dairylea Milk Products	49 Park Avenue
Daitch Crystal Dairies	4 Walnut Avenue
Dellwood Dairy	87 Pell Street
Elmhurst Milk Co.	15 Sherman Avenue
Merit Farms Inc.	9 Reade Street

①

Bache & Co. Bond Offerings

Cleveland, City of	5%	25 years
Detroit, City of	4%	18 years
Iowa, State of	4%	20 years
New York, School District of	5%	19 years
Pittsburgh, City of	5%	23 years

②

Goldstein and Jacobson Company—June Personnel Summary

Departmental Descriptive Title	Number of Employees Men	Number of Employees Women
Accounting	2	4
Administration	6	1
Advertising	5	2
Company Training	3	0
Credit Department	6	4
Internal Auditing	2	0
Inventory Control	3	1
Personnel	2	3
Production	9	8
Purchasing	8	1
Secretarial	0	9
Shipping	5	0
Warehousing	7	0

③

Jackson Bakeries, Inc. — Board of Directors

Name	Occupation	City of Residence	Present Age
Howard C. Kaye	Attorney at Law	Albany	56
Albert P. Ward	Labor Arbitrator	Buffalo	48
Samuel N. Dunn	Purchasing Agent	Auburn	37
Donald G. Bell	Professor	Utica	52
James L. Wilson	Company Treasurer	New York	49
Alice E. Macon	University Dean	Rochester	40

④

Corporative Credit Ratings

Corporation	Location	Type of Business	Rating	No. of Employees
Domb & Co.	Auburn	Stock Brokers	AA	15
Gill, Inc.	Buffalo	Meat Packers	B	36
Gibson Co.	Utica	Travel Agents	AAA	24
Harris Co.	Yonkers	Textile Jobbers	A	17
Lee Films	Ithaca	Film Processors	A	19
Fisher Co.	Albany	Auto Retailers	B	28

⑤

New York State Telephone Employees Scheduled for Promotion

Name	Location	Position Old	 New	Effective Date
Allenstone, John T.	Albany	Lineman	Line Chief	January 18
Barton, J. Cameron	Elmira	Operator	Supervisor	February 15
Sullivan, Roberta	Troy	Toll Clerk	Operator	November 24
Zuiderman, Frederick	Utica	Cable Splicer	Installer	September 27

⑥

⑦ Kline Company Personnel

Office Manager	Home Mailing Address
John Mayne	839 East Lane
Robert Larke	627 Main Street
Jane Simpson	52 Lake Street
Edna Vernon	1164 Amsterdam Avenue

⑧ 8th Election District New Voter Profile

Robert Abrams	51 Madison Avenue	Democrat	Single
Harold Acker	23 Park Avenue	Republican	Married
Larry Atkin	47 Lexington Avenue	Independent	Single

Business Films Currently Available

Title	Distributor	Time (in minutes)
Office Equipment	Trainfilms, Inc.	20
Job Applications	National Film Board	18
Improving Typing Speed	Educational Aids	32
Modern Accounting Principles	Cox Films Co.	46
Why Life Insurance?	National Film Board	15
Profit and Loss	National Education Board	17
Secretarial Duties	J. Clark + Co.	29

⑨

⑩

Industrial Film Strips Available

Item No.	Title
A-1590	Industrial safety means better wages
B-2473	Industrial safety is elementary
B-6085	Play safe when you work with machines

⑪

Buffalo Itinerary, September 1

7:28 a.m.	Leave Chicago Airport
9:46 a.m.	Arrive Buffalo; met by Mr. Taylor
1:30 p.m.	Luncheon with Mr. Carr
3:45 p.m.	Appointment with Mr. Young, Dunlop

⑫ Greenside College Secretarial Department Program

Number	Course Title	Instructor
106	Shorthand	Baker
110	Typing	Cox
221	Filing	Gill
403	Accounting	Lee

⑬ Mailing List for Vermont Customers

Dealer	Street Address	City or Town	Purchasing Agent
Camp Carol	190 Town Square	Arlington	L. Jones
Camp Poultney	18 Park Place	Putney	L. Keys
The Mountain Haven	Montpelier Blvd.	Barre	T. Jackson
New England Shop	132 Seventh Ave.	Newport	S. Brandon
White Motel	U.S. Highway 74	Woodstock	N. Moore

Employee Responses to Attitude Questionnaire

Name	Position	Office or Department	Responses	
			Yes	No
R. Anderson	Supervisor	Secretarial	74	26
G. Bowman	Director	Research	37	63
H. Hancock	Director	Personnel	81	19
F. Knight	Manager	Retail Store	58	42
R. Patton	Chief Accountant	Accounting and Billing	54	46
S. Smith	Senior Agent	Purchasing	86	14

⑭

Departmental Student Representatives to Discipline Board

Art	Janet Clarke	Louisiana	Baton Rouge
Business	Paul Harcourt	Wisconsin	Madison
English	John Garvey	Massachusetts	Boston
French	Rosa Calvert	New York	New York
Mathematics	Tom Jennings	Michigan	Worcester
Physical Education	Mary Sayles	Florida	Miami
Science	Cynthia Marks	Michigan	Detroit
Sociology	Jill Jones	Connecticut	Hartford

⑮

1968 Typing Contest — Department Winners

Name	Department	Speed (in wpm)
May Wilson	Sales	93
Janet Burns	Accounting	82
Elaine Gordon	Administration	74
Gail Fox	Reception	65

⑯

Standing Committees, as of April 14, 1968

Andrews, Judith	Curriculum
Braver, Lee	Welfare
Caxton, William	Research
Coleman, Jason	Extracurricular
Framingham, Edna	Measurements
Glenn, Jack	Measurements
Klingman, Lawrence	Research
Lincoln, Marianne	Curriculum
Lopez, Trina S.	Extracurricular
Malone, Bernice T.	Welfare
Ruth, Marion T.	Research
Steinbauer, J. Grant	Measurements

⑰

Salaries and Ratings of Branch Office Personnel

Branch Office	Name of Manager	Annual Salary (in thousands of dollars)	Annual Rating
Fort Worth	J. Martinique	25	Excellent
Los Angeles	A. Corbett	16	Good
New York	B. Carey	12	Excellent
San Francisco	J. Miller	10	Fair
Seattle	F. Kennison	14	Good
Wilmington	K. Aubrey	13	Poor

(18)

Expectations of Crawford High School Seniors

Expectation	No. of Students	
	Boys	Girls
College	57	66
Employment	89	48
Marriage	10	23
Military Service	45	12

(19)

Textile Remnants and Odd Lots for Clearance

Muslin	Unbleached	5 yards
Foulard	Blue, White Dots	7 yards
Worsted	Charcoal	1 bolt
Rayon	Canary Yellow	3 yards
Cashmere	Sepia	8 feet
Netting	Loose-knit, White	4 yards
Gabardine	Olive Green	2 bolts
Linen	White, Soiled	6 yards
Suede	Dark Blue	4 feet
Broadcloth	Pale Blue	9 yards
Buckram	Gray, Irregular	8 yards
Flannel	Green	1 bolt

⑳

Collegiate Straw Vote - 1968

Democratic Nominee	Number of Votes	
	Boys	Girls
Hubert H. Humphrey	24	12
Robert F. Kennedy	59	71
Eugene McCarthy	67	38

(21)

Bourne Elementary School Textbook Requisitions

Number Requested	Author	Title	Edition
34	Strong	How Airplanes Work	Third
29	Vincent	How Trains Work	Second
65	Kerr	How We Travel on Water	Second
18	Botts	Let's Read for Fun	Fourth
37	Kirstenburg	Adventures in Art	First
29	Cheney	How Clothing is Made	Third
64	Carson	Travels Around the World	Fifth

㉒

㉓

Additions to Television Shooting Schedule, 1968

Title	Producer	Director	Date	Place
The Tiger	Goldblatt	Bellarosa	May 13	Studio 47
Navajo	Kipp	Roy	May 25	Studio 35

㉔ Bond Status

Type of Bond	Yield in 1968	Maturity Date	
		Issued	Year of Maturity
Coupon	4%	July	1972
Debenture	5%	August	1980
Savings	6%	September	1990

Manuscript #1 Instructions: Begin 1½ inches from the top, using a 1½ inch left side margin, and a 1 inch right side margin.

Solid Caps → The Office Encounters Change

Gone is the day of the old-fashioned office where one may have found the bookkeeper at a tall desk, perched on a high stool very much resembling that reserved for the class dunce. The modern bookkeeper no longer wears a green shield over his eyes to protect ~~them~~ him from the glare of poorly shaded electric lights.

Gone, too, is the quill pen, often replaced these days by bookkeeping machines ~~and~~ computers and.[1] ← Close up to no spaces

The "note-takers"—the male secretaries of early office days—have disappeared, replaced, as we know, by the ~~efficient~~ female secretaries who are now indispensable to the businessman.

Indent first line 5 spaces; 2nd line at margin. → [1] Peter N. Mason, Automation in the Office (Newark, N.J.: Arthur Jones Co., 1966), p. 46.

Manuscript #2 Instructions: Begin 1½ inches from the top, using a 1½ inch left side margin, and a 1 inch right side margin.

Solid Caps → Retirement Needs

Life expectancy in the United States has passed the biblical three score and ten years. A child born in 1966 can expect to live, on the average, for 70.1 years.[1] This is an 18-month increase over the 1952 figure of 68.6 years.[2]

Longevity raises many new problems. How will man manage his retirement years? Will he have enough funds for all his daily ~~day to day~~ needs and for any ~~special~~ emergencies that may arise? Will he have interests that prevent boredom? No ¶ → These are the important questions that society must answer.

Space line

[1] The World Almanac, 1968 Centennial Edition (New York: Doubleday and Co., Inc.), p. 899.

[2] U. S. Bureau of the Census, Report on the Aged (Washington: GPO, 1967), p. 2.

Solid Caps

Manuscript #3 Instructions: Begin 1½ inches from the top, using a 1½ inch left side margin and a 1 inch right side margin.

Center

Effect of Dictation Machines on Job Requirements

The growing use of dictation machines is bound to affect the work done by typists. ¶While some people believe that any good typist can ~~easily~~ switch with ease to machine transcription[1], others feel that a trained person ~~does the~~ can do a better job.[2] ¶Turning out a mailable piece of work on the first try requires several ~~qualities~~ things: understanding the meaning of the copy, selecting margins that result in attractive placement of the material on the page, and, of course, typing accurately ~~and~~ quickly. and

close up to 1 space.

---

[1] J. R. Lee, Training for Typists (Detroit: Mark Typing Co., 1960), p. 7.

1 space here

[2] S.E. Fay, Machine Transcription (Chicago: Bower Dictation Co., 1962), p. 3.

Manuscript #4 Instructions: Begin 1½ inches from the top, using a 1½ inch left side margin, and a 1 inch right side margin.

PROPER SEATING
FOR OFFICE WORKERS

Triple Space →

These a ya; chairs for office workers are designed to "raise job output and reduce fatigue."[1]

No ¶ → Chairs come in several ~~depths~~ widths, and their height is adjustable to height ~~of the~~ desk and to the leg length of the worker. Flexible back rests are also common.

---

[1] R. Mage, Work Fatigue (Boston: Dunn + Co., 1947), p. 13.

Manuscript #5 Instructions: Begin 1½ inches from the top, using a 1½ inch left side margin, and a 1 inch right side margin.

Solid Caps and Center

Perserverance for Sales Success

Triple Space

A survey of 6,000 companies ~~firms~~ of every type revealed that salesmen who give in easily do not succeed.[1] ¶ This supports the ~~old proverb~~ saying that "Victory goes to teh one who hangs on longer than his opponent."

Indent 5 spaces

---

[1] J. Paul lc Stevenson, "Salesmen Who Win," Sales Research Quarterly 18: 122-123. December, 1950.

Single space and lower to bottom of page.

Manuscript #6 Instructions: Begin 1½ inches from the top, using a 1½ inch left side margin, and a 1 inch right side margin.

Initial Caps only →

SOCIAL SECURITY TAXES

Social Security taxes are relatively new on the American scene. Legislation was initially introduced in 1936 and went into ~~force~~ effect on January 1, 1937. A number of amendments since that time have brought under its coverage a large segment of the population.

In the beginning a~~n~~ 1% old age and survivors' insurance tax was levied on the first $3,000 of income.[1] This amount was matched by an equal contribution by the employer. Today, the tax rate has risen to 4.4% on the first $6,600 of income for both employer, ~~and~~ employee, and with additional increases already planned.

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[1] Arthur D. Madison, A History of United States Taxes (Boston: Harrison Publishing Co., 1968), p. 43.

1 inch bottom margin only.

Manuscript #7 Instructions: Begin 1½ inches from the top, using a 1½ inch left side margin, and a 1 inch right side margin.

Center

Air Parcel Post

Delete underscore

2 spaces here

Air Parcel Post is of two types: foreign ~~and~~ domestic. and

No ¶

While most people know about the former, few are aware of the method of handling foreign parcel post, unless he happens to be a traveler.

or a foreign trade businessman

¶ While all parcels must carry the notation "~~V~~ia Air Mail" and bear the name and address of the sender, international parcels must also include a customs tag, which can be obtained from the postmaster.[1]

lower case v

Foreign packages should be handled only by qualified postal employees, as ~~some~~ rates and conditions frequently change. A ~~package~~ parcel for a foreign destination should never be placed ~~just~~ in a letter box.

---

[1] *Directory of International Mail* (Washington: GPO, 1968), p. 45.

Lower to bottom of page

Manuscript #8 Instructions: Center this copy both vertically and horizontally. You will have to estimate in advance how much space you will need, and place it on the page accordingly.

Solid Caps
and delete
underscore → To All Employees

In ~~special~~ honor of the 50th anniversary of

the Board of Directors has , August 6,

Acme, Inc., ~~we have~~ voted that Friday be a full

(No space before or after dash)

holiday for all employees -- with pay.

Your ~~usual~~ paycheck for the week will

special

include also a bonus based on the length of

Acme

your employment with ~~us~~. #Congratulations to each

one of you for your fine work during the year past.

Double space →

Type at
center

The President

Manuscript #9 Instructions: Begin 1½ inches from the top, using a 1½ inch left side margin, and a 1 inch right side margin.

Solid Caps → Vacation Calender

Department heads are requested to submit to the personnel manager by June 1 a schedule fro summer vacations for all employees under their supervision. ¶ As in earlier years, older employees ~~will~~ have first choice of vacation dates.[1] 2 spaces here New employees ~~get~~ earn 1 day for each month.

---

[1] See *Personnel Notice*, No. 5, February 10, 1968.

Manuscript #10 Instructions: Center this copy both vertically and horizontally. You will have to estimate in advance how much space you will need, and place it on the page accordingly.

Solid Caps → To All Branches

Fall

Details on our new ^ line will be sent to you by July 20. The new line will be advertised nationally during the week before Labor Day. ¶ All remaining summer goods are to be advertised in ~~the~~ local papers in an effort to clean them out by mid-August.

Double Space →

old goods

This office is to be informed daily, by wire, of ~~summer stock~~ still on hand, starting on July 5.

Sales Manager.

Manuscript #11 Instructions: Begin 1½ inches from the top, using a 1½ inch left side margin, and a 1 inch right side margin.

Solid Caps → Computer Files

issues

The use of high-speed filing systems and computers in the retrieval of personnel information raises many ~~serious questions~~ on invasion of privacy. ¶ There is a tendency to collect more information because of easy storage. Much of this information, however, is

personnel

not essential for quality ^ management. Seconily, as a person usually has no idea of what is filed, he has no self-defence against false information.[1] Finally, with machine inter-change of information, access to records by illegal tapping is a serious problem.[2]

---

[1] E. Lanham, "EDP in the Personnel Department," Personnel, March-April, 1967, p. 22.

[2] A. F. Westin, Privacy and Freedom (New York: Atheneum Press, 1967), p. 161.

Lower to bottom of page

Manuscript #12 Instructions: Begin 1½ inches from the top, using a 1½ inch left side margin, and a 1 inch right side margin.

THE MECCA OF THE WORLD

People of all nations have been attracted to Paris, making it the uncrowned capital of the world. Fortunately, two major wars have left her virtually unharmed, and she remains a city of beauty and culture.

Paris was originally called Lutetia by the Gallic Tribe of Parisii[1] and came into historic prominence shortly before the birth of Christ.

The Romans became interested in the city and conquered it during the first century A. D. In the third century, barbarians took control of the city from the disintegrating Roman Empire. It was at this time that the city's name was changed to Paris.

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[1] Andrew T. Jackson, *The Origins of Paris* (New York: Tamis Publishing Co., 1964), p. 2.

Manuscript #13 Instructions: Center this copy both vertically and horizontally. You will have to estimate in advance how much space you will need, and place it on the page accordingly.

Triple Space → Long Distance Calls Center →

Station Calls

Station-to-station rates apply when~~ever~~ you will ~~speak~~ talk with anyone who answers the telephone. You do not request a specific department ~~or~~ person or.

Triple Space →

Person Calls

¶ Person-to-person rates apply if you will talk only with a certain person.

Triple Space →

Collect

Most telephone calls can be "collect" if the person called agrees to pay.

Manuscript #14 Instructions: Center this copy both vertically and horizontally. You will have to estimate in advance how much space you will need, and place it on the page accordingly.

Solid Caps

Triple space → Modern Telephone Services

Automatic Answering Set

Keep your office open 24 hours a day. This ~~equipment~~ set automatically answers your telephone and, if desired, records messages left in your absence.

Triple Space →

Extension Telephones

¶ Enjoy the convenience of step-saving extension phones. They come in many beautiful colors to blend with your furnishings.

Speakerphones

A sensitive microphone picks up your voice from ~~several~~ many feet away. Your hands are free ~~for note-taking,~~ and you can converse without lifting the reciever.

Call Director

Underscore →

~~Versatile~~ sp push-buttons connect you with other extension phones. You can hold some calls while answering others, signal other phones, and talk in conference to a number of other phones.

Manuscript #15 Instructions: Center this copy both vertically and horizontally. You will have to estimate in advance how much space you will need, and place it on the page accordingly.

CREDIT POLICY

Paul Blake & Sons was founded on the principle of giving maximum quality and service for minimum cost.

Basic to this is the need for keeping down the cost of collections. Therefore, we have cash dealings with all our customers, with the exception of those with high credit ratings, to whom credit is extended for 7 days following receipt of the goods.

Manuscript #16 Instructions: Begin 1½ inches from the top, using a 1½ inch left side margin, and a 1 inch right side margin.

Corporate Organization

The reasons for the rapid growth of the corporate forms of business organization can be seen in those features that distinguish it from the proprietorship and partnership. The corporation is a legal entity all its own. It receives its charter on application to the state government. Through its managers, it can do many of the things that were once done by the proprietor or one of the partners.[1]

The concept of limited liability provides great protection for the owners of a corporation in the event of a financial loss or bankruptcy.

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[1] Theodore J. Sielaff and John William Aberle, *Introduction to Business* (Belmont, California: Wadsworth Publishing Company, Inc., 1966), p. 37.